REPORT
OF THE
DEFENSE SCIENCE BOARD
TASK FORCE
ON
INTERNATIONAL ARMAMENTS COOPERATION

INTERNATIONAL ARMAMENTS COOPERATION IN AN ERA OF COALITION SECURITY

AUGUST 1996

This report is a product of the Defense Science Board (DSB). The DSB is a Federal Advisory Committee established to provide independent advice to the Secretary of Defense. Statements, opinions, conclusions and recommendations in this report do not necessarily represent the official position of the Department of Defense.

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188
Exp. Date: Jun 30, 1986

1a. REPORT SECURITY CLASSIFICATION
Unclassified

1b. RESTRICTIVE MARKINGS
N/A

2a. SECURITY CLASSIFICATION AUTHORITY
N/A

3. DISTRIBUTION/AVAILABILITY OF REPORT
Distribution Statement A
Approved for Public Release: Distribution is unlimited

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE
N/A

4. PERFORMING ORGANIZATION REPORT NUMBER(S)
N/A

5. MONITORING ORGANIZATION REPORT NUMBER(S)
N/A

6a. NAME OF PERFORMING ORGANIZATION
Defense Science Board, Ofc of the Under Secy of Def (A&T)

6b. OFFICE SYMBOL (*If applicable*)
DSB/OUSD(A&T)

7a. NAME OF MONITORING ORGANIZATION
N/A

6c. ADDRESS (*City, State, and ZIP Code*)
The Pentagon, Room 3D865
Washington, DC 20301-3140

7b. ADDRESS (*City, State, and ZIP Code*)
N/A

8a. NAME OF FUNDING/SPONSORING ORGANIZATION
Defense Science Board, OUSD(A&T)

8b. OFFICE SYMBOL (*If applicable*)
DSB/OUSD(A&T)

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
N/A

8c. ADDRESS (*City, State, and ZIP Code*)
The Pentagon, Room 3D865
Washington, DC 20301-3140

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
N/A	N/A	N/A	N/A

11. TITLE (*Include Security Classification*) Report of the Defense Science Board Task Force on International Armaments Cooperation

12. PERSONAL AUTHOR(S)
N/A

13a. TYPE OF REPORT
Final

13b. TIME COVERED
FROM N/A TO N/A

14. DATE OF REPORT (*Year, Month, Day*)
960506

15. PAGE COUNT
114

16. SUPPLEMENTARY NOTATION
N/A

17. COSATI CODES

FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*)

19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21 ABSTRACT SECURITY CLASSIFICATION

22a. NAME OF RESPONSIBLE INDIVIDUAL
Diane L.H. Evans

22b TELEPHONE (*Include Area Code*)
(703) 695-4157/8

22c. OFFICE SYMBOL
DSB/OUSD(A&T)

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

OFFICE OF THE SECRETARY OF DEFENSE
3140 DEFENSE PENTAGON
WASHINGTON, DC 20301-3140

DEFENSE SCIENCE
BOARD

July 31, 1996

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (A&T)

SUBJECT: Defense Science Board International Arms Cooperations Task Force Report

Enclosed is the final report of the Defense Science Board Task Force on International Arms Cooperation, chaired by Jack Gansler. There are not significant changes to the findings and recommendations since you were briefed; however, they have incorporated the information you requested at that briefing (specifically, information on the potential role and procedures regarding NATO, and two examples of how the model might be implemented).

We believe that the recommendations of this Task Force are an important change in the way we go about doing international cooperative efforts and, if implemented, would significantly raise the probability of success on future selected programs--as well as increasing the number of such efforts. I would urge you to staff this report among the Services and OSD, and then to move out on the implementation actions as quickly as possible. Specifically, three critical actions are:

- The issuance of a new policy directive based upon the recommended 8-point model;

- The initiation of a few new programs at the next CNAD meeting (based upon the model); and,

- The implementation of the proposed OSD reorganization in order to achieve a focus in this area within the Secretary's Office, and to give a clear signal to our allies of our intent to step-up our activities in the international arena.

Finally, in response to your request, the Task Force is sending you under separate cover a Working Group report on a policy recommendation with regard to source code data control.

Craig I. Fields
Chairman

Attachment

OFFICE OF THE SECRETARY OF DEFENSE
3140 DEFENSE PENTAGON
WASHINGTON, DC 20301-3140

DEFENSE SCIENCE
BOARD

July 24, 1996

Dr. Craig Fields
Chairman
Defense Science Board
The Pentagon
Washington, DC

Dear Craig:

Attached is the final report of the Defense Science Board's Task Force on International Armaments Cooperation, entitled *International Armaments Cooperation in an Era of Coalition Security*. Despite the breadth and scope of the issue, we believe that the Task Force fully responded to the challenge, and devised a new approach for international armaments cooperation in the 21st Century. It addresses the changing geopolitical, military, technological, economic and industrial environment, and identifies eight elements (in priority order) critical to the success of any such venture:

- Defining a National Security Objective
- Selection of Common Mission Problems
- Requirements Generation
- Satisfying Industrial and Economic Objectives
- Required Industrial Structure
- Maintenance of Competitive Market Forces
- Government Role
- Execution of Programs

The attached table lists the recommendations of the Task Force. Recognizing the inherent resistance to a change of this magnitude, the Task Force believes that sustained, high-level leadership is necessary for success. And, while most weapons programs will remain national or regional in nature, the Task Force is convinced that more successful transatlantic cooperative efforts will result if the model is implemented.

In conclusion, I wish to thank the members of the Task Force, as well as its government advisors, for the considerable time and effort they spent in developing this blueprint. I believe the end product reflects the value of this contribution.

Very truly yours,

Jacques Gansler
Task Force Chairman

Summary of Task Force Recommendations

Office	Action Items
SecDef	1. Establish a clear national policy framework, based on the model, and assure that it is agreed to by OSD, the Services, other relevant agencies, and the Congress. Evolve this policy in consultation with potential international partners. 2. Direct USD(A&T) to review current and planned international arms cooperation efforts in light of framework. 3. Merge the various, dispersed elements throughout DoD with responsibility for international acquisition and technology programs into a single, coherent organization. In particular, the SecDef should: – Consolidate all OSD international implementation activities into one organization that reports to USD(A&T), encompassing the functions of: • OSD International Programs Office • Defense Technology Security Administration (DTSA) • Defense Security Assistance Agency (DSAA) – Establish a position at the Assistant Secretary level to pro-actively manage these activities 4. Facilitate continuous involvement by senior leadership. 5. Urge the Military Committee of NATO and the Major NATO Commands to give priority in their requirements generation activities to working with CNAD via the CAPS process.
USD(A&T)	1. With the Service Secretaries, assign outstanding officers to international programs, and institute incentive structures. – Build in performance and career incentives that encourage international cooperation. – Elevate international experience to the same level as "joint duty." – Assure that cooperative programs are led by program managers with international/joint experience. 2. Initiate a thorough training program to educate program managers. 3. Establish administrative procedures that require that acquisition executives and program managers demonstrate serious attention to international opportunities. This should be required at the department-wide level for ACAT I programs, and in Service reviews for smaller-scale programs. 4. Accelerate "acquisition reform"—with a focus on short cycle times—by providing special waivers to facilitate international programs (e.g., multi-year funding and DARPA's "other agreements authority") 5. Establish a project team to review 50 international programs, and make recommendations for long-term improvement. This team should be comprised of not more than 50 percent "internationalists," and should deliberate for no more than six months. 6. Propose to CNAD, at its next meeting, that the results of the CAPS process be given higher priority.
USD (Policy)	Create a special fast-track process within DoD for resolving technology transfer issues arising in international cooperative programs, and ask the State Department to collaborate in designing an expedited process outside DoD.
Service Secretaries	Create Service incentives for international armaments cooperation by linking international programs to military missions and priority needs.
CJCS	Insert CINCs into the definition of coalition needs by convening them frequently enough to create an advocacy group for interoperability and relationship-building with other countries.

ABSTRACT

During the 1980's and 90's, international armaments cooperation has been a course of only intermittent interest to the United States. In contrast, commercial industry has increasingly relied on collaborative efforts in high technology, and the payoffs have been significant. Recognizing this potential synergy, armaments cooperation is clearly an attractive policy option, particularly in a period of constrained resources—one that can achieve strengthened military coalitions as well as broader national objectives. The attached report contains the findings and recommendations of the Defense Science Board's Task Force charged with examining the best way for the Department of Defense (DoD) to pursue that cooperation. In it, the Task Force defines a new "model" for DoD to implement in its future armaments cooperation. The essence of the model is that DoD should view collaborative international programs, first and foremost, as an important means of attaining U.S. geopolitical and military objectives. However, if the model is adopted by DoD, collaborative programs will also have the potential of generating net economic and industrial benefits.

As an essential element of this new model, in order to proactively explore opportunities for collaboration, the Secretary of Defense should consolidate several existing offices into one organization focused on the implementation of armaments cooperation agreements. This organization would work with the CINCs and their foreign counterparts to identify high-priority military missions that are likely to be undertaken in a coalition context. Once these mission areas have been agreed upon, the Office of the Secretary of Defense (OSD) and the Joint Staff would identify required new military capabilities that could then serve as objectives for transatlantic collaborative programs. Additionally, some new capabilities will be achievable via harmonization of existing requirements, coordination of logistics operations, etc., and OSD should assure that such steps are taken. All areas appropriate for enhancing coalition security capability could then be explored via a high-level NATO forum and/or bilateral or multilateral discussions. Realizing that much military equipment is intended to satisfy a nation's unique requirements, and that, even in areas of potential coalition activities, the perception of the threat may be viewed differently, there will be only a limited number of opportunities for common armaments development; but these must be exploited.

For those new capabilities that require common new or modified coalition equipment, OSD, the Services and their foreign counterparts would form an international program implementation office. This office would be responsible for: (1) broad program performance and affordability goals; (2) determining a required range of workshare percentages, based on expected national contributions; (3) implementing early agreements on third-country sales, technology transfer restrictions, and withdrawal penalties; and, (4) maintaining the visibility and availability of viable, competitive mission alternatives. The office would not, however, establish detailed equipment specifications, nor any program's specific industrial structure. Instead, it would assist individual international program offices in inviting industry on both sides of the Atlantic to submit proposals embodying specific equipment design, program structure details and work assignments through the life cycle of the

program. Individual industry teams would be expected to establish "world class" capabilities through the inclusion of at least one firm from each participating nation in meeting the national workshare requirements. Thus, competitive market forces would be utilized to assure that the economic and industrial benefits of collaborative armaments efforts are realized, along with the motivating geopolitical and military objectives of coalition activities. It must be emphasized that, with the proposed model, all money contributed by a nation to a joint program is returned to that nation in purchased goods and services; thus, employment impacts are limited solely by a nation's defense budget. This feature should minimize the political implications of joint efforts, and will result in more national security for the same level of defense expenditures and employment.

The following eight pages summarize the Task Force's approach to implementing this model within DoD. The attached appendices provide the background upon which these findings and recommendations are based.

TABLE OF CONTENTS

INTRODUCTION

As defense budgets around the world continue to shrink, nations are faced with the difficulty of maintaining a viable defense industrial capability without eliminating the presence of continuous competition and its concomitant advantages in both cost and performance. As a result, international armaments cooperation is increasingly being considered as a means for achieving coalition and broad national security objectives in the post-Cold War era. However, despite the many benefits (including access to global state-of-the-art technologies; potential economies for R&D, production and life support; and, military interoperability for both warfighting and support), international collaboration has proven to be of limited interest to the U.S. national security establishment over the past two decades.

Accordingly, the Under Secretary of Defense for Acquisition and Technology requested that a Defense Science Board (DSB) Task Force on International Armaments Cooperation be formed to investigate two broad issues:

1. A description of a generic model of international armaments cooperation for the 21st Century which will assure that: (1) effective competition is maintained; (2) effective two-way technology transfer occurs; (3) maximum use is made of the civil industrial base; and, (4) the United States has continued access to critical military technologies.

2. The identification of specific management actions that must be implemented by DoD to allow successful program execution on international efforts (i.e., where the promised benefits of economic efficiency, enhanced performance, and shorter schedules will actually be achievable).

In giving the Defense Science Board this tasking, the Under Secretary emphasized the critical timing of this effort. Over the next few years, military and defense industry trends in Europe and the U.S. will have long-term implications for these nations that can be positive or negative; thus, the criticality of this investigation at this time.

By way of structure, Appendix K of this report contains the Terms of Reference, while Appendix A lists the Task Force members and government advisors. During the course of its work, the Task Force relied on many resources to augment its understanding of the issues to be addressed. Appendix L lists the many representatives of the military, government agencies and industry that gave of their time to brief the Task Force on a variety of topics. Appendix M lists the various materials referred to by the Task Force to establish a factual record upon which to build. The Task Force gratefully acknowledges the contribution of these sources to this report. The briefing presented to the Under Secretary of Defense for Acquisition and Technology can be found in Appendix B.

BACKGROUND

While the collapse of the Soviet empire in 1989, and its impact on defense spending, has dramatically affected the US national security environment, two other independent events—a "revolution in military affairs" and a "revolution in business affairs"—are simultaneously forcing defense planners to reevaluate long standing trends in weapon system development.

The ongoing transition from "attrition warfare" to "information-based warfare" (or "reconnaissance/strike warfare") has been referred to as a "revolution in military affairs." Under this operational doctrine, the focus is on information technology. Large weapons platforms (e.g., warships, fighter planes, tanks) are seen as subordinate to all-weather, 24-hour intelligence systems; real-time command, control, and computing systems; and long-range, precise "brilliant" weapons. Additionally, the U.S. has begun to recognize (in such places as the Persian Gulf and Bosnia) the political and/or military necessity for *coalition operations* (in terms of interoperability, intelligence-sharing, training and, perhaps most importantly, trust).

Advances in information technology have also made possible a "revolution in business affairs." Historic weapons acquisition trends indicate a persistent focus on achieving higher performance regardless of cost (currently estimated at $3B/ship and $1B/bomber) or development time (now up to 16 to 20 years), and often at the expense of reliability. By contrast, *world-class commercial* firms are achieving higher performance and quality in complex, high-technology systems while lowering costs (even in small quantities) and cutting development/deployment time dramatically (to a few years, or less). In addition, while defense support systems remain stuck in the past (i.e., a large, organic infrastructure and just-in-case inventories), commercial firms have streamlined their operations and now provide just-in-time (on demand) support in just a few days—or even within hours—worldwide. Thus, the U.S. and its allies must depend on *international, commercial firms* to provide the leadership (in terms of cost, cycle time, performance and quality) necessary to complete the required weapons acquisition and support transformation.

The Task Force believes that the following areas are of particular importance to the future international security environment:

- The changed political, military and economic environment—especially the increasing dependence on coalition warfare and the growing dependence on commercial industrial technology;
- The recent "lessons learned" on how to achieve cooperative success from the growing number of commercial international alliances;
- The historic problems in achieving successful transatlantic cooperative defense programs; and,
- The recent defense industry trends toward regional consolidation—in both Europe and the U.S.—that run counter to coalition political/military integration, economic efficiency and proliferation control.

With these factors in mind, the Task Force concluded that a new approach is not only desirable but required for successful transatlantic defense cooperation. Fortunately, this need has been recognized within the Department of Defense (DoD), and the Defense Secretary and his Under Secretary for Acquisition and Technology are leading the effort.

A New Model for International Armaments Cooperation

In developing a new model of international cooperation for the 21st Century, the Task Force concluded that a prerequisite for success is the recognition that international cooperation is not an objective in and of itself. The U.S. and other nations should pursue such opportunities only when they make sense for geopolitical or mutual security reasons and/or to meet a specific need of coalition warfare. Additionally, the nations must maximize alliance defense resources and realize net economic and industrial enhancements in the process. Toward this end, the Task Force believes that a concentrated focus on military interdependence will provide the basic incentives for successful armaments collaboration.

The following eight elements were adopted by the Task Force as the basis of a desirable model for international cooperation in the early 21st Century. For each element, the past approach is discussed and contrasted with what is required under the new model.

Element 1: Defining a National Security Objective: Historically, the U.S. has looked to cooperation as a means by which to save resources (often on lower priority systems), without an appropriate focus on clear or overriding national security objectives. The Task Force urges DoD to correct this oversight by issuing an unambiguous statement of geopolitical and military focus. Of course, the overall objective of cooperation must be enhanced coalition capability in all areas, not just in cooperative weapons programs. While the Task Force recognizes that most programs will continue to be national or regional in origin, it supports the establishment of a significantly greater number of transatlantic cooperative efforts focused on the highest priority coalition needs, and calls on U.S. and European senior government leaders to facilitate this process.

Element 2: Selection of Common Mission Problems: Historically, the main focus of international cooperation has been on armaments programs. The Task Force found that an emphasis should now be placed on meeting important 21st Century coalition security needs, and identified several areas in which this criterion can be met:

- Command, control, intelligence, surveillance and reconnaissance;
- Multilateral interoperability of communications;
- Dispersed force effectiveness;
- Extended air defense;
- Real-time intelligence fusion and distribution;
- Ongoing, common "challenges" (e.g., mines);
- "Friend, foe or neutral" identification;
- Force projection capability;
- Precision strike capability; and,
- Coordinated logistics (see Appendix H).

It should be noted, however, that since the perception of the threat varies from nation to nation, mission needs assessments will also differ. Accordingly, the focus of international cooperation must be on those areas where common needs can be identified.

Element 3: Requirements Generation: In the past, programs were structured according to each government's desired performance requirements (e.g., if one side wanted to fly higher, and the other faster, both requirements were adopted). As a result of this unwillingness to compromise, the price

of weapon systems continued to rise. The Task Force concluded that a new emphasis should be placed on arriving jointly at acceptable mission performance requirements, balancing "cost as an independent variable" (affordability), meeting coalition military capability needs, and assuring interoperability. The Task Force believes that the presence of cost constraints will force the necessary tradeoffs.

Element 4: Satisfying Industrial and Economic Objectives: History has shown that many, if not most, of the economic, operational and political benefits that should theoretically flow from multinational research and development (R&D) and production programs have been difficult to attain. Past programs rarely have been structured in accordance with the principles of economic and industrial advantage, and often have exhibited a considerable amount of duplication of capability among the partners, resulting in overcapacity. When objectives are not achieved, negative political fallout ensues. Still, the Task Force believes that collaboration has the potential to be cost-effective and technologically advantageous, from an alliance perspective, as it represents a more rational pooling and sharing of increasingly limited resources. To realize its full benefits, however, nations must view and conduct program selection, the establishment of program goals, and program structuring in the same manner as future warfighting and crisis operations—from a coalition, or an alliance, industrial/economic perspective. Properly constituted, international cooperation provides a greater defense capability for the same amount of dollars, and protects jobs by assuring that national employment corresponds to the money a nation expends on its defense budget.

Element 5: Required Industrial Structure: For the most part, governments have traditionally specified their industry team members and teaming arrangements. The Task Force urges the adoption of a new approach that will infuse competition into the process by empowering industry. As envisioned, "world class" program teams, comprised of transatlantic primes and subcontractors, would compete to solve problems within the general business rules established by partner governments. Maximum use should be made of commercial and dual-use industrial capabilities. As the preservation of national capabilities is often desirable, nations can maintain the option of sourcing "critical" defense capabilities and technologies (in both Europe and North America)—either commercially or through small, next-generation R&D contracts—but outside of the cooperative program (if their contender is not on a winning team).

Element 6: Maintenance of Competitive Market Forces: In the past, "learning curve" cost reductions were not fully realized as single sources were selected for development and production in both the United States and Europe (and, thus, the competitive incentives for cost reductions and performance enhancements were not present). Under the new model, the threat of competition (and termination) is maintained through a viable, alternative "strategic competitor" after source selection is made. These alternatives must be visible within the program, and no other "national solutions" should be pursued in parallel (including secret activities). It should be noted, however, that two sources for the same product are not required to maintain competition; rather, another potential way of meeting the mission need (e.g., a potential upgrade of a current system or an acceleration of a next-generation system) is sufficient. (Please see Appendix F for a discussion of the Task Force's notion of "strategic competition," and Appendix G for evidence of the benefits of continuing competition versus single sourcing.)

Element 7: Defining the Government Role: In the past, governments played a dominant role in establishing the international industrial structure for cooperative programs. Under the new model, governments collectively (and in consultation with industry) establish business rules prior to reaching an agreement. Such rules must include agreement on such issues as technology transfer controls, third country sales, penalties for withdrawal, and dollar levels of work share, <u>but not</u>

industrial structure. A primary focus of these business rules should be to ensure that, for each "dollar" contributed to a program, a nation receives an equivalent work share. This assures that overall national employment is not affected by such ventures. The Task Force believes that competitive, transatlantic industry teams (referenced above) should be empowered to structure the sources of suppliers, consistent with the governments' agreed-upon business rules. The specifics of "which firm does what work in each country" must be decided by these teams through market interaction, not government dictate. (Appendix D contains a summary of pertinent observations drawn from successes and failures.)

Element 8: Execution of Programs: In the past, statutory, regulatory and cultural constraints affecting both government and industry have been barriers to successful execution. Under the new model, these barriers would be minimized through changes in policy, procedures and organization. The tools and technologies for success exist, but they must be employed within the proper structure. Recognizing this, the Task Force recommends the following actions be taken:

- *Policy*
  - Establish a clear national policy framework, based on the model, and assure that it is agreed to by OSD, the Services, other relevant agencies, and the Congress (Appendix J outlines the significant ambiguities in current policies and regulations identified by the Task Force.)
  - Evolve this policy in consultation with potential international partners
- *Procedural*
  - Achieve continuous involvement by top OSD, CINC and Service leadership, as well as partner government equivalents, via a high-level NATO forum and/or bilateral or multilateral meetings (Appendices I and E provide a description of potential international forums and two examples of model application.)
  - Accelerate "acquisition reform"—with a focus on short cycle times—by providing special waivers to facilitate international programs (e.g., multi-year funding, DARPA's "other agreements authority")
  - Create incentives for international programs
    - For the Services—link directly to military missions
    - For individuals—link to career advancement (e.g., count as "joint" assignments)
- *Organizational*
  - Consolidate all OSD international implementation activities into one organization that reports to USD(A&T), encompassing the functions of:
    - OSD International Programs Office
    - Defense Technology Security Administration (DTSA)
    - Defense Security Assistance Agency (DSAA)
  - Establish a position at the Assistant Secretary level to pro-actively manage these activities
  - Assure that cooperative programs are led by program managers with international/joint experience

The Task Force sees great value in the establishment of a single organization that can pro-actively pursue and oversee international implementation activities in the acquisition community, while reserving policy issues for the appropriate policy bodies. This action is justified considering:

- *The Lack of Formal Policy Guidelines*

  There is no approved statement of defense policy on the conduct of international cooperative programs and defense trade matters within DoD. The last formal statement was promulgated by Secretary Weinberger in the mid 1980's. Since then, such policy has been inferred from the level of interest displayed by the incumbent Secretary or his deputy for acquisition and technology. While there is no doubt about the current Secretary's support for international cooperation and defense exports, the only formal pronouncements that might be construed as "policy" have been those issued in response to an audit report by DoD's Inspector General on improving international cooperation research and development programs, and a memorandum establishing the Armaments Cooperation Steering Committee, both on 25 June 1993.

- *Fragmented Organization*

  Over the years dating back to the mid 1970's, several Defense Science Board task forces and, more recently, the Defense Policy Advisory Committee on Trade (DPACT) have recommended that the Secretary of Defense consolidate the many offices involved in international cooperation and defense trade. Many of these studies, however, were issued near the end of the various administrations, leaving insufficient time for implementation. As a result, the structure of DoD remains clumsy and ineffective. Currently, no single voice exists within OSD for the implementation of international programs. Each office has its own narrow goals and objectives, and views armaments cooperation from a parochial perspective (e.g., a dynamic tension exists between those who would share technology with allies and those who would hide it). DoD and U.S. industry are thus hindered in their ability to respond quickly to events, and achieve the cooperative agreements and industrial alliances required to compete in the global market.

In summary, the model proposed by the Task Force provides for:

- Selection criteria based on common coalition needs;
- The maintenance of a competitive alternative on a transatlantic, industrial basis;
- Necessary policy, procedural and organizational changes;
- The national option for sourcing critical defense capabilities and technologies in both Europe and North America; and,
- The potential to realize even greater collective industrial cooperation as the process matures, and as trust and understanding evolve.

IMPLEMENTATION ACTIONS

The Task Force recognizes that this model will be difficult to implement, in light of its "counter cultural" aspects. In particular, it will require:

1. Sustained, high-level leadership in implementing the model, developing institutional processes, and pursuing successful programs;
2. The generation of public and congressional/parliamentary support. (The Task Force believes that the "warfighting" community can be of great assistance in overcoming resistance, speaking from authority as the combatant in any coalition warfare effort. The model's neutral impact on employment and its positive impact on national security should also be stressed); and,
3. A cognizance of the potential dangers of regional consolidations in the defense industry, namely "Fortress U.S." and "Fortress Europe" (with the associated levels of reduced competition, increased vertical integration, increased political power, increased focus on third-country arms sales, etc.). Transatlantic industrial alliances of a variety of forms can help significantly by breaking down nationalistic biases while satisfying national government "business rules."

The incentive to pursue international armaments cooperation varies sharply among the various levels within DoD. While the Secretary of Defense and his principal deputies are highly motivated in this regard, program managers, by and large, do not appear to share this enthusiasm. This divergence of views must be scrutinized. Fundamentally, the investment/return relationship for each level tends to drive this separation, as follows:

Level	Investment/Cost	Return
SECDEF/USD	• Personal time • Personal influence • Domestic political criticism (jobs)	• Political cooperation with allies • Interoperability • Influence in Europe
CINCs	• Personal time • Personal influence	• Interoperability • Improved coalition working relationships
Services	• Risk of losing control • Risk of losing money • Greater complexity • Slower progress (perceived) • Higher cost (perceived)	• Incremental funding for marginal programs
Program Manager	• Greater complexity (MOU) • Less appreciation • Not "mainstream" • Career neutral/negative	• Personal growth

This misalignment in incentives closely parallels the problems that large U.S. corporations faced in the 1960's and 1970's as they expanded internationally. This activity was often considered peripheral, disruptive, non-responsive and unrewarding. In addition, managers from other countries were often viewed as less competent, more confusing, and less dedicated than their American counterparts. Only when senior managers became involved in international endeavors and a "fast track" promotion path was instituted for individuals with international experience, did the

organization, as a whole, begin to change and accept international activity as "mainline," important and worth supporting.

In these same corporations, when only the Chairman or President advocated international activity, his vehicles of communication—speeches, symbols and exhortations—were successfully ignored. These executives did not prevail because they did not have the time to press the "international" issue among all the other demands placed on their time. So, too, with DoD. Until international programs become a "mainline" activity among the top ten percent of DoD leadership, international cooperation will be a collateral activity that requires disproportionate effort to realize even meager gains. (Please see Appendix C for further discussion of the lessons learned from international commercial collaboration.)

Accordingly, the Task Force urges DoD to take the following steps in order to facilitate the requisite cultural shift:

1. Assign outstanding officers to international programs;
2. Elevate international experience to the same level as "joint duty" in the selection criteria for promotions;
3. Convene the CINCs frequently enough to create an advocacy group for interoperability and relationship-building with other countries;
4. Reward success in international efforts, including R&D, by publicly recognizing deserving program managers and commanders; and,
5. Establish a project team to review 50 international programs, and make recommendations for long-term improvement. This team should be comprised of not more than 50 percent "internationalists," and should deliberate for up to 6 months.

CONCLUSION

First and foremost, the Task Force believes that there is a compelling need for international cooperation in the development and production of armaments—particularly with European allies. Without considerable changes in the ways that DoD and U.S. allies approach cooperation, however, the Task Force has concluded that efforts to develop and implement cooperative programs will likely meet with significantly less success than is needed.

Further, the Task Force believes that it is important to underscore the need for change in the near future. Both increased impatience on the part of our European partners and increased pressures to move to defense industrial programs that exclude U.S. participation will undoubtedly lead to adverse consequences, absent renewed efforts on the part of the U.S. There is, at this time, what has been referred to as a "window of opportunity" which will inevitably close unless there is substantial renewed effort and a net diminution of current impediments.

Recognizing the profound changes taking place in the world today—geopolitical, military, technological, economic and industrial, their implications, and the resultant need for new approaches, the Task Force has developed a new approach for defense industrial cooperation which contains some significant new concepts:

- Geopolitical needs must serve as the primary "drivers" of defense relationships, including defense industrial relationships;

- Coalition warfighting needs must predominate in assigning priorities and program selection;

- "Strategic competition" within defined program areas must be maintained;

- Industry-led, competitive, international industrial teaming and collaborative arrangements framed by industry are critical; government involvement in such arrangements should be minimal;

- Prior agreement in such areas such as third-country sales and technology transfer is important to the success of most international programs; and,

- The option of maintaining independent defense industrial capabilities in areas of defense technology considered critical must be left to individual nations, regardless of their participation in collaborative programs.

The Task Force recognizes that in order to bring about significantly greater and more effective defense industrial cooperation with allies and friends, and to implement a new approach, a "cultural change" is needed within the U.S. and partner governments. This can only be brought about with a clear vision of goals and objectives, strong articulation of same, and, most importantly, the *sustained* involvement of government officials at the most senior levels.

Perhaps most importantly, it must be recognized that if the U.S. is to rise to the kinds of extraordinary challenges which it is likely to face during the next few decades, new approaches will be necessary. For such challenges, the Task Force is convinced that the U.S. will be better able to respond *with* effective coalition partnerships than without.

It is with this in mind that the Task Force submits the following recommendations, summarized below:

Summary of Task Force Recommendations

Office	Action Items
SecDef	1. Establish a clear national policy framework, based on the model, and assure that it is agreed to by OSD, the Services, other relevant agencies, and the Congress. Evolve this policy in consultation with potential international partners. 2. Direct USD(A&T) to review current and planned international arms cooperation efforts in light of framework. 3. Merge the various, dispersed elements throughout DoD with responsibility for international acquisition and technology programs into a single, coherent organization. In particular, the SecDef should: – Consolidate all OSD international implementation activities into one organization that reports to USD(A&T), encompassing the functions of: • OSD International Programs Office • Defense Technology Security Administration (DTSA) • Defense Security Assistance Agency (DSAA) – Establish a position at the Assistant Secretary level to pro-actively manage these activities 4. Facilitate continuous involvement by senior leadership. 5. Urge the Military Committee of NATO and the Major NATO Commands to give priority in their requirements generation activities to working with CNAD via the CAPS process.
USD(A&T)	1. With the Service Secretaries, assign outstanding officers to international programs, and institute incentive structures. – Build in performance and career incentives that encourage international cooperation. – Elevate international experience to the same level as "joint duty." – Assure that cooperative programs are led by program managers with international/joint experience. 2. Initiate a thorough training program to educate program managers. 3. Establish administrative procedures that require that acquisition executives and program managers demonstrate serious attention to international opportunities. This should be required at the department-wide level for ACAT I programs, and in Service reviews for smaller-scale programs. 4. Accelerate "acquisition reform"—with a focus on short cycle times—by providing special waivers to facilitate international programs (e.g., multi-year funding and DARPA's "other agreements authority") 5. Establish a project team to review 50 international programs, and make recommendations for long-term improvement. This team should be comprised of not more than 50 percent "internationalists," and should deliberate for no more than six months. 6. Propose to CNAD, at its next meeting, that the results of the CAPS process be given higher priority.
USD (Policy)	Create a special fast-track process within DoD for resolving technology transfer issues arising in international cooperative programs, and ask the State Department to collaborate in designing an expedited process outside DoD.
Service Secretaries	Create Service incentives for international armaments cooperation by linking international programs to military missions and priority needs.
CJCS	Insert CINCs into the definition of coalition needs by convening them frequently enough to create an advocacy group for interoperability and relationship-building with other countries.

APPENDIX A

MEMBERSHIP

MEMBERSHIP

Dr. Jacques S. Gansler, TASC, Inc., Task Force Chairman*

Task Force Members

Dr. Carol Evans, Georgetown University
Dr. Ken Flamm, Brookings Institution
Dr. Vitalij Garber, Garber International Associates
Dr. Ted Gold, Hicks and Associates*
Mr. Everett Greinke, International Planning and Analysis Center
Dr. Robert Hermann, United Technologies Corporation*
Dr. Don Hicks, Hicks and Associates
Mr. Trevor Jones, International Development Corporation
Mr. Michael Rich, RAND
Mr. Howard Samuel, Council on Competitiveness
Mr. John Stewart, McKinsey & Company, Inc.*

Independent Reviewers

Mr. Dean Clubb, Texas Instruments, Inc.*
Mr. Gordon England, GRE Consultants*

** DSB Member*

Note: While Task Force membership indicates support for the general thrust of this report, it does not constitute endorsement of every recommendation. Affiliations are listed for identification purposes only, and do not represent any association with these findings.

GOVERNMENT ADVISORS

Secretariat

Mr. Andrew P. Gilmour, Executive Secretary
LTC Thurston Van Horn, USA, DSB Representative

Advisors

Mr. Alfred Volkman, Principal Director for Armaments Cooperation (International and Commercial Programs)
Mr. Steve Austin, Planning and Analysis (International and Commercial Programs)
Dr. John Transue, Office of the Director, Defense Research and Engineering
Mr. Thomas Perdue, Office of Advanced Technology
Dr. Spiros Pallas, Office of Strategic and Conventional Programs
Mr. Clarence Juhl, Office of NATO Policy
Mr. Stuart Schwartzstein, OUSD Policy
COL Robert Filbey, SARD/ZS
Mr. Stan Hicks, Navy International Programs Office
Col Dave Abati, SAF/IAQ

APPENDIX B

TASK FORCE BRIEFING TO THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY

International Arms Cooperation in an Era of Coalition Security

Phase I: United States and Europe

Executive Briefing

by the

Defense Science Board Task Force
on International Arms Cooperation

Office of the Under Secretary
for Acquisition and Technology

The Changing National Security Environment

- Likelihood of coalition operations
- Rapidly declining defense budgets among likely coalition members
- New paradigm for military operations emerging ("The Revolution in Military Affairs" with its heavy reliance on information technology)
- "The Revolution in Business Affairs" (including the increasing reliance on commercial industry)

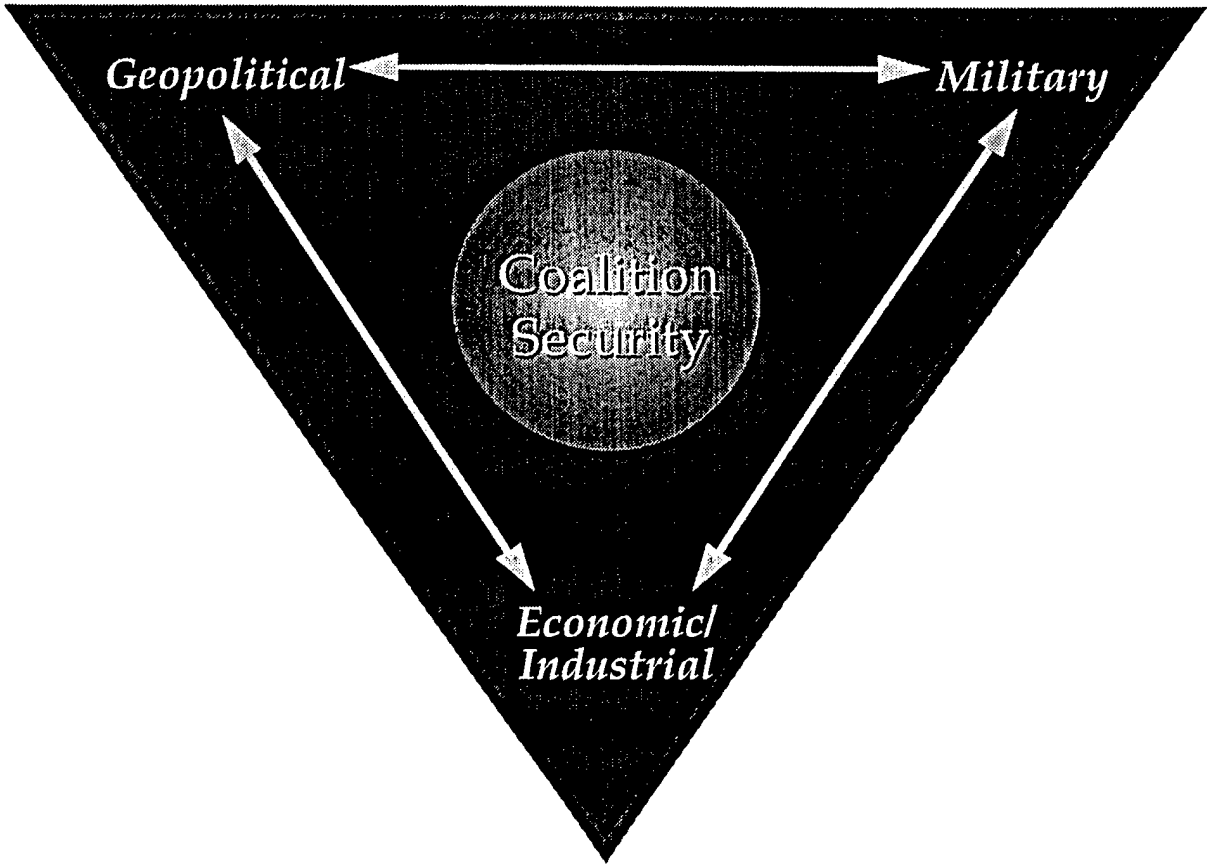
Premise

Recognizing:

- The changed military and economic environment
- The growing number of successful commercial international alliances
- The historic problems in achieving successful transatlantic cooperative defense programs
- Recent defense industry trends toward regional consolidation in both the U.S. and Europe

A new approach is required to achieve successful transatlantic defense cooperation

Balancing Factors



Obtain coalition security through balancing geopolitical, military and economic/industrial factors

Objective -- Strategy -- Tactics

Basic Ground Rule for International Arms Cooperation in the 21st Century

- International cooperation is not an objective in and of itself
- The U.S. should pursue such cooperation:
  - For specific political or mutual security ends
  - To meet a specific need of coalition warfare
  - While realizing net economic and industrial enhancements, and maximizing scarce alliance defense resources

The Proposed Model Provides for...

- Selection criteria based on common security needs
- A continuous alternative (competition) on an international (transatlantic) industrial basis
- Necessary policy, procedural and organizational changes
- The national option for sourcing of critical defense capabilities and technologies in both Europe and North America
  - What is considered critical may be different in individual countries
- The potential to realize even greater collective industrial cooperation as trust and understanding evolve

Elements of a New Model for International Arms Cooperation for the 21st Century

1. Geopolitical/Military Objective
2. Common Mission Problems
3. Requirements Generation
4. Industrial and Economic Objectives
5. Required Industrial Structure
6. Competitive Market Forces
7. Government Role
8. Execution of Programs

1. Geopolitical/Military Objective

In the past, the objective was focused on way to save money, often without any clear, overriding military objective

The overall objective of cooperation must be enhanced coalition capability

- "Coalition" is broadly defined for specific, mutual geopolitical/military objectives

- Cooperative weapons programs are only a part

2. Common Mission Problems

- In the past, DoD's international focus was mainly on cooperative arms programs
- New emphasis must be placed on cooperation in meeting important 21st century coalition security needs in areas such as:
  - Command, control, intelligence, surveillance & reconnaisance
  - Multilateral interoperability of communications
  - Dispersed force effectiveness
  - Real-time intelligence fusion and distribution
  - Ongoing "challenges" (e.g., mines)
  - "Friend, foe or neutral" identification
  - Coordinated logistics
  - Precision strike capability
  - Extended air defense

Focus on Common Mission Problems

3. Requirements Generation

- In the past, programs were structured according to each government's desired performance requirements
  - Little compromise by either side
  - Resulted in expensive systems
- New emphasis should be placed on:
  - Joint arrival at acceptable mission performance requirements
  - Balancing "cost as an independent variable" (affordability)
  - Meeting coalition military capability needs
  - Assuring interoperability
  - Common mission models (linked distributed simulations)

4. Industrial and Economic Objectives

- Past experience has shown that many, if not most, of the economic, operational and political benefits that *should* theoretically flow from multinational R&D and production programs have been difficult to attain
  - Past programs rarely have been structured in accordance with the principles of economic and industrial advantage, and have often exhibited a considerable amount of duplication
- However, collaboration still has the potential to be cost-effective and technologically advantageous *from an alliance perspective* as it represents a more rational pooling and sharing of increasingly limited resources
- DoD needs to view and conduct program selection, the establishment of program goals, and program structuring in the same way as it views and conducts warfighting and crisis operations--from a coalition or an alliance industrial/economic perspective

5. Required Industrial Structure

- In the past, governments have specified their industry team members and teaming arrangements
- The new approach will empower industry to create "world class" international teams composed of transatlantic primes and subs that will compete to solve problems
  - Within general business rules established by partner governments
  - Maximum use should be made of commercial and dual-use industrial capabilities
  - Nations can maintain the option of sourcing "critical" defense capabilities and technologies in both Europe and North America (in the commercial sector or outside the program)
  - Preserving national capabilities is acceptable, if announced

6. Competitive Market Forces

- In the past, single sources were selected for development and production in both the U.S. and Europe, and "learning curve" cost reductions were not realized
- The new model must maintain the threat of competition (through a viable alternative "strategic competitor") after source selection is made
  - Two sources for the same product are not required
  - Simply, another potential way of meeting the need is sufficient (e.g., upgrade of current system or acceleration of next generation system)
  - Often, competition at lower tiers may be desireable (again, between different approaches)
  - The competitive alternative(s) should be viable and visible within the program
  - A credible threat of termination must be maintained

7. Government Role

- In the past, governments played a dominant role in establishing the international industrial structure for cooperative programs
- In the new model, governments collectively (and in consultation with industry) establish business rules--prior to reaching agreement--in areas such as technology transfer controls, third-country sales, penalties for withdrawal, and dollar levels of work share, but <u>not</u> in industrial structure
  - Competitive transatlantic industry teams will structure the sources of suppliers, consistent with governments' business rules

8. Execution of Programs

In the past, statutory, regulatory and cultural constraints have been barriers to successful execution

- Barriers Affecting Industry:
  - Security and technology disclosure
  - Foreground data rights
  - Onerous bid and proposal and contract requirements
  - Clear communication of program ground rules
- Barriers Affecting Government:
  - Differing budgeting processes and modernization schedules
  - Cultural and historical biases against international cooperation
  - Different perceptions of "requirements"/needs
  - Competitive, national programs
  - Differing military tactics, doctrine and techniques
  - Fragmented government organizations
- Barriers Affecting Both Industry and Government:
  - Loss of jobs
  - Loss of industrial base
  - Loss of technological leadership

Continued

8. Execution of Programs *(cont.)*

In the new model, such barriers are mitigated through changes in:

- Policy
- Procedures
- Organization

The tools and technologies for success exist, but they must be employed within the proper policy, procedural and organizational structure

Continued

8. Execution of Programs: Policy

- Establish a clear national policy framework based on the model, and assure that it is agreed to by OSD, the Services, other relevant agencies and the Congress
  - Recognize that jobs follow national expenditures for each country
- Evolve this policy in consultation with international partners

8. Execution of Programs: Procedures

- Achieve continuous involvement by top OSD, CINC and Service leadership, as well as partner equivalents
- Accelerate "acquisition reform"--with a focus on short cycle times
  - Provide special waivers to facilitate international programs (e.g., multi-year funding, "other agreements authority")
- Create incentives for international programs
  - For the Services--link directly to military missions
  - For individuals--elevate international focus by establishing a link to career advancement (e.g., count as "joint" assignments)

8. Execution of Programs: Organization

- Consolidate OSD international implementation activities into one organization that reports to USD(A&T), encompassing:
  - OSD International Programs Office
  - Defense Technology Security Administration (DTSA)
  - Defense Security Assistance Agency (DSAA)
- Programs led by Program Managers with international/joint experience

Rationale for Change in Organization

- **Goal**: To create a single organization that can pro-actively pursue and oversee international implementation activities in the acquisition community, while reserving policy issues for the appropriate policy bodies
  - New organization responsible for negotiation and oversight of international information exchange, R&D, cooperative developments, co-production, FMS, foreign acquisition, international logistics, export licensing, foreign visits, and implementation of national disclosure policies
- Recommendations to consolidate international implementation functions have been made numerous times
  - 1990 DPACT report
  - Several Defense Science Board reports (Currie study and others)
- Coordination of defense trade and cooperation issues is not systematically well organized
  - No single voice for implementation of international programs; multiple DoD components are not effective
  - Insufficient integration with DoD acquisition community
- Opportunities being lost to:
  - Tailor designs and production to meet alliance needs, and
  - Achieve advantages of global competitive forces for defense R&D, production and logistics

Issues Regarding Model Implementation

- The need for sustained leadership on evolving the details of the model and pursuing successful examples
- The need to generate public and Congressional/ Parliamentary support
- The increasing number of regional consolidations in the defense industry (with its resulting reduced levels of competition, vertical integration, increased political power, focus on third-country arms sales, etc.)

Conclusion

- The Task Force recognizes this dramatic period of geopolitical, military, technological, economic and industrial change, and has developed a new model to address this new environment
- The model contains some significant new concepts:
  - Geopolitical motivations
  - Coalition, mission-driven selection
  - Cost constraints on "requirements"
  - "Strategic competition" maintained
  - Industry-led international industrial teaming
- The Task Force recognizes that a "cultural change" is required to implement the new model throughout US and allied governments
- The Task Force recognizes that sustained, high-level management involvement is required for success
- The Task Force recognizes that most weapons programs will be national or regional in nature; but, based on coalition needs, there should be more transatlantic cooperative efforts

Specific SecDef Actions

1. Issue a new policy framework based on the proposed model
2. Direct USD(A&T) to review current and planned international arms cooperation efforts in light of the framework
3. Implement procedures to accelerate acquisition reform, create incentives for international program participation, and ongoing involvement by OSD, CINC and Service leadership, as well as partner equivalents
4. Consolidate OSD International implementation activities into one organization
5. Assure DoD implementation of model as follows:
   - USD(A&T) consult with National Armaments Directors
   - Gain support and leadership of defense ministers and military/ warfighters to the approach and the initial problems for focus
   - Building on support of U.S. and foreign defense leadership, expand to national-level agreements (President and the Congress)
   - Issue policy guidelines (including goals and procedures)
   - Identify further coalition needs that lend themselves to cooperation
   - Evolve cooperative agreements appropriate to the model

APPENDIX C

LESSONS LEARNED FROM INTERNATIONAL COMMERCIAL COLLABORATION

LESSONS LEARNED FROM INTERNATIONAL COMMERCIAL COLLABORATION

Introduction

International collaboration, particularly in the form of strategic alliances, among commercial and defense-related companies, has grown exponentially even as transatlantic government-led armaments cooperation has become increasingly problematic. The implications of commercial alliances for international defense cooperation are far reaching, especially given the greater reliance on the commercial world for critical defense technologies. In most high technology industries, such as aerospace, semiconductors, telecommunications equipment, and automotive, international commercial alliances (ICAs) are the norm rather than the exception. (For example, Figure C-1 summarizes business/capital relations among leading semiconductor manufacturers.) Today, the task for global high technology companies is not whether to collaborate, but how to manage collaborative alliances effectively. This appendix provides a brief overview of international commercial alliance activity, and applies some of the lessons learned from the experiences of businesses to the task of improving international defense collaboration.

Trends in International Commercial Alliances

Beginning in the 1980s, various data sources show a steady upward trend in the growth of international commercial alliances. As indicated by Figure C-2, provided by McKinsey & Company, commercial strategic alliances have increased by 20%, compounded annually. Figure C-3 demonstrates that such alliance activity has not only increased rapidly, but is taking place in key defense-related industries such as automotive, aerospace, information technology and biotechnology. While alliances between U.S. and European companies remain strong, teaming arrangements of U.S./European companies with Japanese partners have experienced the most growth, beginning in the mid-1980s.

A number of economic, technology and government-related factors explain this surge in alliance formation activity. A brief analysis of these factors is useful because of their applicability to DoD efforts to encourage greater transatlantic defense collaboration.

Economic:

- Product demand is more homogenous in world markets. Access to both the U.S. and foreign markets has become crucial.
- There is global surplus capacity. Key, defense-related industries in both the U.S. and Europe are undergoing major rationalization and consolidation via mergers and acquisitions.
- Need to reduce costs

Technology-related factors:

- Shorter production life cycles
- Escalating R&D costs
- Technology leveling: foreign companies are more technologically competitive and better able to exploit technology; superior technology is now found in many places worldwide
- Most advanced technologies are now dual-use

High technology companies in the U.S. and elsewhere must have access to an increasing and diverse array of technologies, if they are to remain competitive. When unable to develop these technologies cost-effectively on their own, firms use alliances as a way of increasing or complementing their existing technological portfolios.

Government-related factors:

- Governments control market access via investment, procurement, regulation and other policies. The emergence of competitive regional trading blocs, particularly under the European Union (EU) integration, is an additional factor.
- Alliances are used by U.S. companies to secure much needed market access as well as favorable national treatment.

These economic, technological and government related factors have motivated U.S. commercial firms to form alliances with foreign partners in many critical high technology sectors. What has accounted for the continued upward surge in alliance activity, however, is the realization, on the part of U.S. companies, that alliances offer many benefits, including:

- Cost and risk sharing
- Greater access to complementary critical technologies
- Global economies of scale and scope
- Standardization
- Market access
- Global competitive position
- Helping to diversify and improve a company's products/services
- Political influence and cooperation

It is interesting to note the tremendous overlap between the benefits of alliances in the commercial world and those that are often cited for armaments cooperation.

Despite such benefits, alliances between U.S. and foreign commercial companies have ended, at times, in bitter "divorces," with neither side securing its key objectives. Many business analysts have pointed to the lack of experience on the part of U.S. companies, which were less used to teaming and managing the delicate balance between competition and cooperation than their European and Japanese counterparts. Additionally, problems, such as incompatible or competing partner objectives, unclear managerial decision-making structures, and cultural clashes, have led U.S. and foreign companies to go their separate ways.

Similar experiences and problems have arisen in transatlantic defense cooperative programs. Nevertheless, as is made clear in Figure C-3, average shareholder returns are positively related to the number of alliances formed. Successful U.S. companies are using alliances effectively to enhance their international competitiveness. The relevant question for DoD is what can be garnered from the experiences of successful international commercial alliances for U.S. transatlantic defense collaboration.

Lessons Learned from ICAs

There are a number of salient lessons learned from commercial alliances that can be applied to improving transatlantic defense cooperation. These lessons can be divided into three categories: 1) successful negotiating strategies; 2) effective organizational structure and managerial involvement; and, 3) developing a corporate culture that supports international collaborative programs.

Negotiating Tactics and Issues

- Establish partners' respective financial commitments.
- Negotiate hard issues, such as technology transfer/safeguard provisions and third-party sales, upfront. Many commercial companies have successfully protected their critical, core technologies. The Task Force heard how GE Aircraft Engines was able to "black box" a critical defense technology in its joint production of the CFM56 engine with France's SNECMA.
- Devise "prenuptial" agreements and exit provisions. Determine triggers for termination, how to value the alliance at termination, penalties for termination, or whether both partners share costs of separating.
- Build in performance incentives that encourage continued cooperation between partners. (For example, when Motorola and Toshiba formed an alliance in the mid-1980s, Motorola agreed to transfer microprocessor technology to Toshiba while gaining Japanese market share for Motorola's products.)

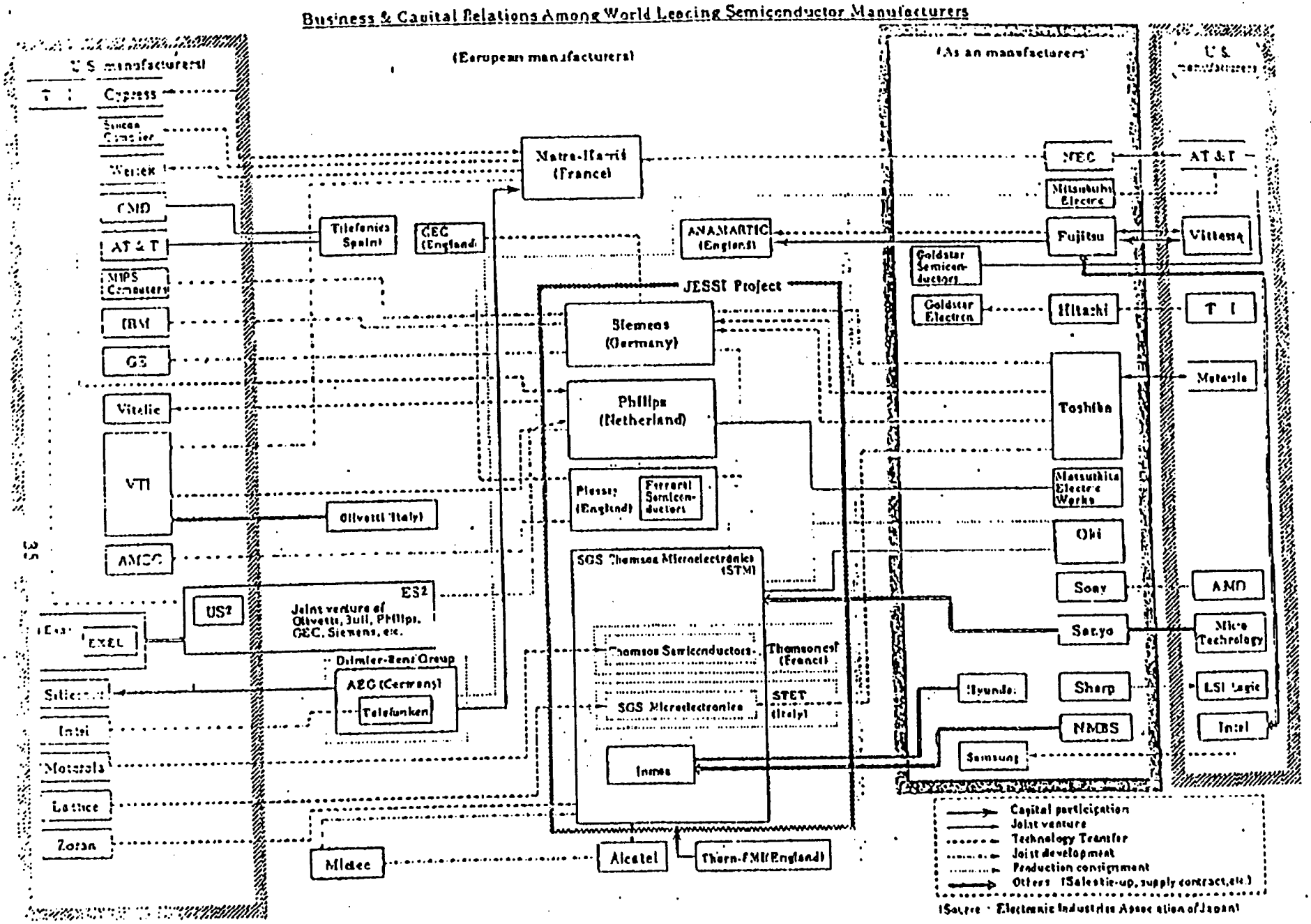
Organizational/Managerial Structure

- Establish an independent, autonomous governance structure. Experience of commercial alliances shows that when partners give the alliance a full business system of its own, with complete decision-making power and a sense of identity, there is a greater chance of long-term success. It helps to simplify coordination problems and creates a multicultural identity.
- Split equity among partners as evenly as possible. Figure C-4 illustrates that when this achieved, a breakup is less likely to occur.
- Involve top management and push alliances from the top down. Without the support of upper levels of management, commercial alliances have stalled and collapsed.
- Institute an incentive structure to reward managers for good performance.
- Institutionalize learning. Successful commercial alliances build in mechanisms for transferring learning from their partners throughout the company. At present, DoD is too decentralized to capture learning from international programs—activities are too dispersed throughout OSD and the Services.
- Initiate training for personnel

Cultural Compatibility

- When relations are characterized by wariness or mistrust, start small and build up. (This tactic has been used by Korean and Japanese firms in semiconductor alliances.)
- Instigate cross-cultural training. DoD needs a more thorough training program to educate program managers. It should also hire people with prior international experience.

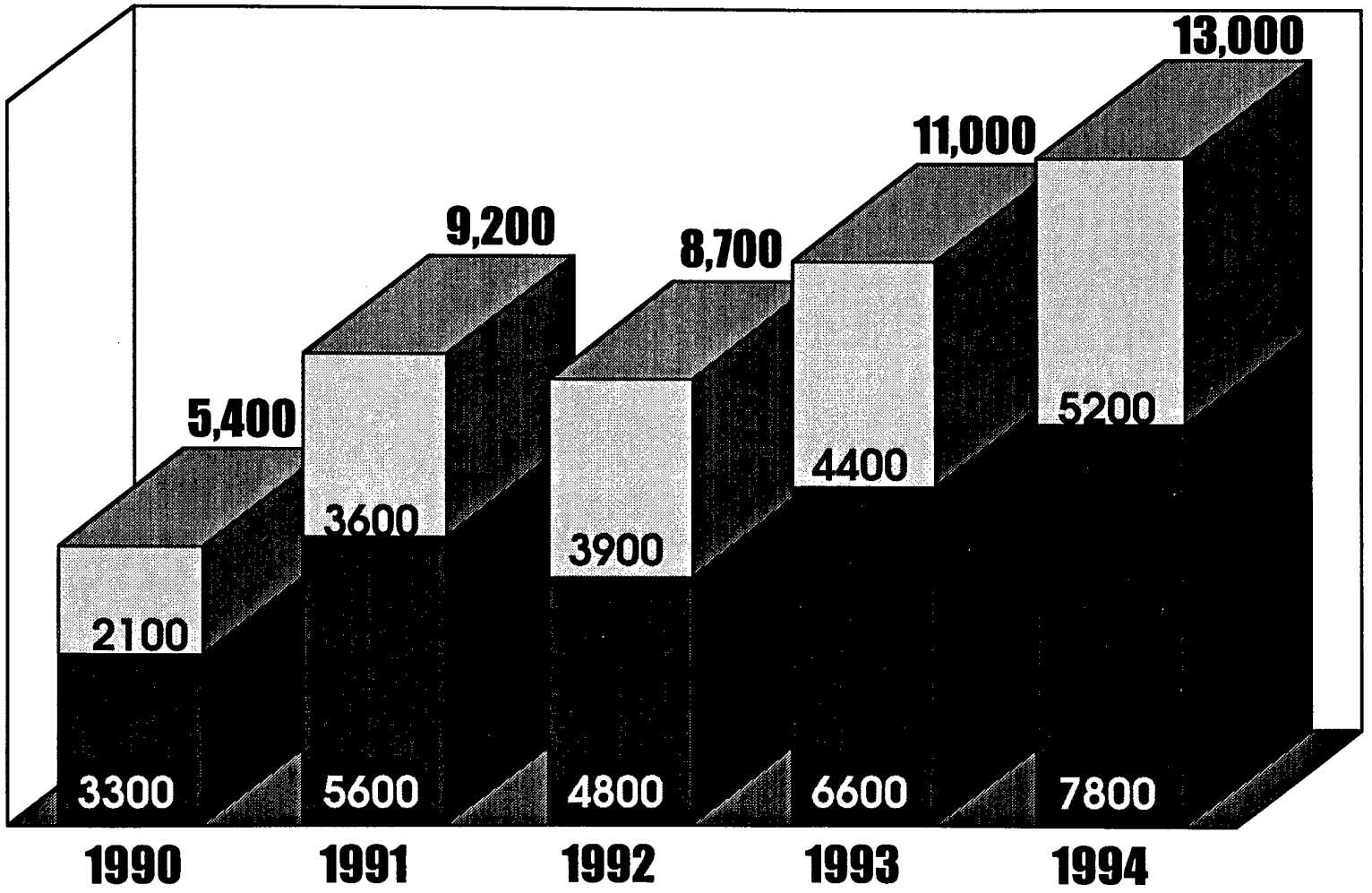
Technology, Fujitsu Co. Ltd., 24 May 1991



Source: Yamamoto, T., International Co-operation in Japan-Europe Information Technology. Fujitsu Co. Ltd., 24 May 1991.

Trends in the Commercial Sector

Number of Alliances Formed Annually



Note: Based on published reports from 471 sources: includes JVs, equity stakes, nonequity alliances such as licensing, manufacturing, marketing, and R&D

Source: McKinsey & Company

Figure 2

Trends in the Commercial Sector

Alliances: US, Europe, and Japan

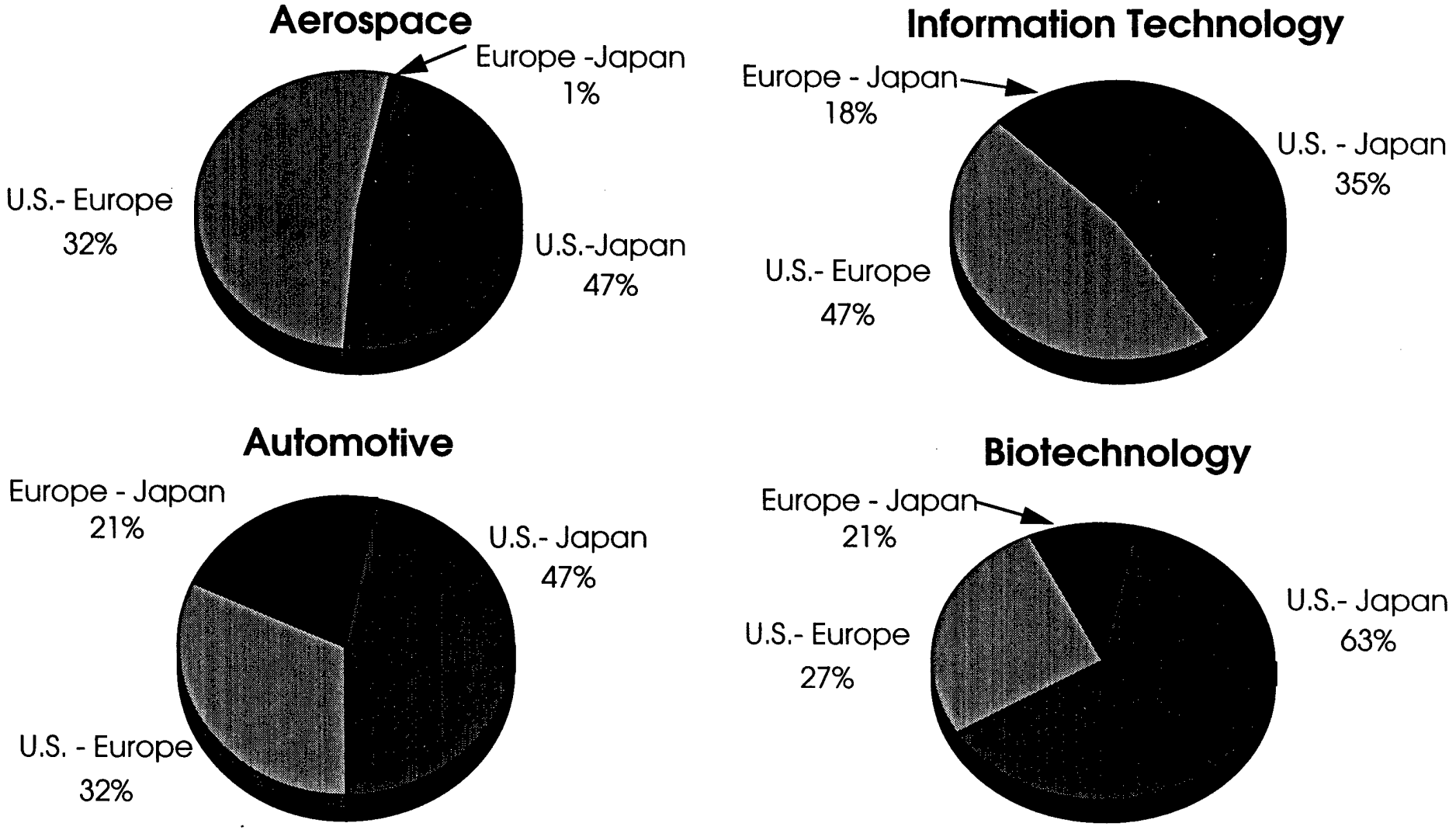


Figure 3

Trends in the Commercial Sector

50/50 Ownership Best For Maintaining Balance

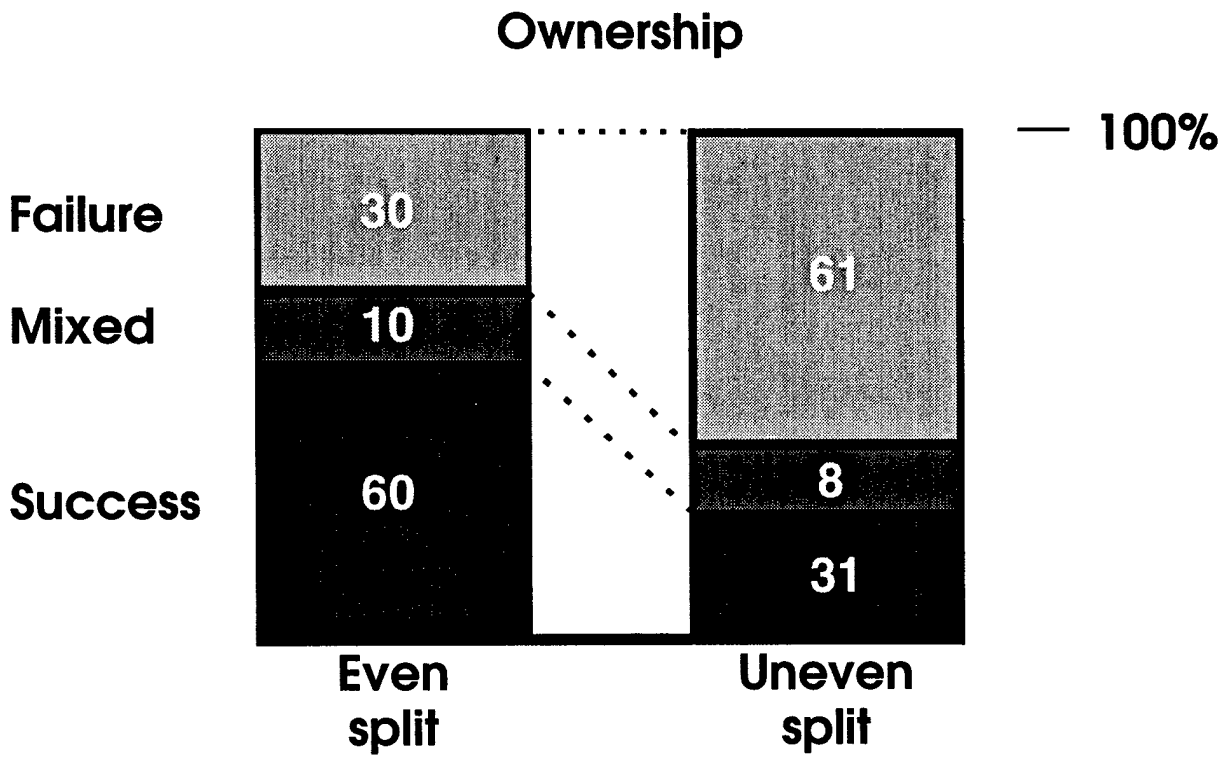


Figure 4

APPENDIX D

OBSERVATIONS DRAWN FROM SUCCESSES AND FAILURES

OBSERVATIONS DRAWN FROM SUCCESSES AND FAILURES

Types of Programs

International armaments cooperation, though most often conceptualized in terms of major systems development projects, takes place in a variety of different types of programs, including pure research and development (R&D) and technology demonstration projects, joint development of major systems or major system components, co-production and licensed production, joint upgrades of common systems, cooperation on logistics, and technology transfer arrangements. In its review of such collaboration, the Task Force found that successes on smaller-scale programs are much more numerous than clear winners on larger-scale efforts.

Examples of Successes on Smaller Programs

There are many examples of successful "pure" R&D efforts that have made significant contributions to systems later developed for DoD. A typical example is the set of projects that the United States has undertaken with Australia, which have provided valuable inputs to DoD's own R&D efforts on radar and electro-optic systems. Highly successful technology demonstration projects include the X-31 aircraft, the air-cushioned landing vehicle demonstration, and the Arrow Theater Missile Defense project. Examples of successful cooperation on systems components include the CFM-56 jet engine, the Universal MODEM, ejection seat development, and heads-up displays now used in US aircraft. Successful upgrade efforts include improvements to the Harrier and F-111 fighter, and the Chapparal and Harpoon missiles. Successful technology transfer efforts include projects with Sweden, and the Topaz reactor with Russia. There are also many examples of valuable cooperation efforts in the logistics area.

Examples of Successes on Larger Programs

While not as common, success stories can also be found in large-scale systems development. Examples include the Rolling Airframe Missile with Germany, the NULKA decoy rocket system with Australia, and the Mark 12 IFF system. DoD has acquired some major systems from allies, including the Fuchs reconnaissance vehicle (for detection of nuclear, biological and chemical agents), the Army's Heavy Assault Bridge, and the main 120mm gun on the M1A1 and A2 tanks. Co-production and licensed production of such systems as Patriot and MLRS, Aegis, and the F-4, F-5, F-15 and F-16 fighters are also regarded as highly successful.

Patterns of Failure

It is not difficult to identify efforts at major systems development that have failed. More interesting and productive, however, is an attempt to identify some common elements of these unsuccessful programs:

- Marginal programs: "Borderline" programs, at the very threshold of meeting the test of return on required investments, have sometimes sought international participation as a means of going forward. These programs have often been terminated, ultimately, in favor of more promising alternatives, but only after engendering considerable resentment and ill will on the part of allies brought into these efforts. Examples include the terminally guided weapon (TGW) and the modular stand-off weapon (MSOW) projects.
- Programs involving large numbers of partners: Complexity and cost rise exponentially with the number of partners involved in the design of a program. Most successful multilateral

programs have started with relatively few participants, with later entrants accepting terms and conditions already negotiated and in place.

- Lack of specificity with regard to crucial details before the program was started: This includes both the requirements for the systems to be developed, and the details of industrial participation. For example, the ill-fated air-to-air missile development initiative with some NATO partners suffered from this problem.
- Competition with a politically powerful US contractor: The NATO frigate program is a notable example of a venture suffering from this problem.
- Political vicissitudes: Initiatives launched by top leadership within the department that have been unable to muster significant and sustained support from the career leadership in the Services and the civilian bureaucracy have tended to founder when the political leadership changes. Whether undertaken for operational, economic or policy reasons, international programs must be able to muster support within the permanent leadership infrastructure in order to be successful over the long term.

Lessons Learned

From this experience, a small number of clear lessons can be drawn:

- Small programs that may fall short of large-scale systems development may lack the glamour of the big ticket items, but they are seen as valuable by all sides, and build working relationships. Measures that make such smaller-scale efforts easier can provide a readily appreciated return which, over the longer term, may make a carefully selected group of larger scale efforts easier.
- Programs with small numbers of participants are easier to implement, and can be expanded, over time, to include larger numbers of allies. Bilateral programs meeting well-defined needs can become the core of an enhanced multilateral project with good chances of success.
- Issues of competition and industrial benefit, as well as political pressures, tend to be smaller with R&D, technology demonstrations, upgrades and other smaller-scale projects, thus improving their chances of success.
- To enhance the probability of success and contribute to the overall atmosphere for international programs, major systems development projects should be chosen with great care and in small numbers. They should be projects on which a substantial consensus exists—or can be created—within DoD that significant economic, political and/or operational benefits can be achieved. They should be programs which are not likely to become marginalized or rendered irrelevant by other efforts within the United States or its cooperating allies. They should be negotiated with sufficient detail on requirements and industrial issues to proceed as a clearly defined program before any commitments are made.
- There are many administrative, personnel and budgetary incentives that must be addressed in order to make international programs work. Program managers should be given formal recognition and career-enhancing credit that encourages them to achieve cooperative international successes. Evaluation, promotion and assignment policies and practices must be changed to make the avenue of international programs attractive from a career perspective, as opposed to the "dead end" it is today.
- Incentives that translate department-wide resource savings, or political gains, into Service-specific benefits should be considered. Administrative procedures that require acquisition

executives and program managers to demonstrate serious attention to international opportunities should be required at the department-wide level for ACAT I programs, and in Service reviews for smaller scale programs.

- The Congress should be consulted and asked to collaborate with DoD in designing a budgetary process that provides greater flexibility and stability for international cooperative programs.
- Technology transfer issues arising in international cooperative programs should be given a special fast-track process within DoD, and the State Department's ODTC should be asked to collaborate in designing an expedited process for licensing. The "fast-track" on technology issues might actually work to create industrial and administrative incentives supporting international collaboration. NDPC reviews should also be expedited.
- Administrative reforms should pull together the various dispersed elements of DoD with responsibility for international acquisition and technology programs into a single, coherent organization designed to provide strong leadership, transform the prevailing culture, and minimize bureaucratic rivalries. These reforms should take place at both the OSD level and within the service acquisition organizations.

APPENDIX E

EXAMPLES OF THE APPLIED MODEL

EXAMPLES OF THE APPLIED MODEL

A. Cooperation in Combat Identification

1. Geopolitical/Military Objectives

Germany, the United Kingdom and France will likely join the U.S. as active participants in many coalition military/peacekeeping operations during the coming years. As such, annual Four Power talks should be scheduled between the U.S. Secretary of Defense (SecDef) and the Defense Ministers of these key European allies to develop and maintain a framework of common geopolitical/military objectives and needs. Though the demands placed on these officials are many, and time constraints and scheduling difficulties must be considered, top leadership must be involved on establishing the overall objectives if they are to have effect.

Initially, the attendees should include senior representatives of the Chairman of the Joint Chiefs of Staff (CJCS) and their military counterparts from each allied nation; the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) and his counterparts; and, the Under Secretary of Defense for Policy (USDP) and his counterparts. Currently, Four Power meetings of acquisition executives are routinely held to discuss areas of cooperation. This proposal would expand this function to include military and policy chiefs; however, overall objectives should be set at the ministerial level. Areas requiring real-time interoperability (e.g., combat identification, air defense battle management) should be the focus of the agenda.

2. Selection of Common Mission Problems

The CJCS and the CINCs (or their representatives) should meet with their allied counterparts to discuss priority military/coalition problems. The focus of these meetings should be to explore, in greater detail, the areas of common mission needs and the selection of areas to investigate for possible cooperative efforts. Combat identification is a likely candidate for discussion.

For each agreed upon area of common need, a panel of military commanders should be organized to conduct requirements generation, and coordinate/implement actions on a continuing basis, including the promotion of activities at subordinate levels and other agencies of interest.

3. Requirements Generation

In the selected mission areas, each standing group would be tasked with achieving agreement on operational requirements. In this manner, a structured dialog among the various U.S., foreign and international operational commands would be established. This process would serve as the principal source for requirements generation in support of allied cooperation in the area of common need, and would be supplemented by cost, schedule, technology and industrial inputs from the USD(A&T) and his counterparts. Resultant research and acquisition cooperation as well as data exchange agreements would be executed by the acquisition offices.

4. Satisfying Industrial and Economic Objectives

The agreed-to joint activities should be conducted through the existing Four Power structure (using appropriate Reciprocal Procurement MOU Committees), and should continue to be led by the USD(A&T) and his counterparts. This structure should be charged with reviewing and defining program approach and selection criteria, specific goals, organization, basic dollar allocation for each program, and broad industrial/economic objectives for cooperation. It must also ensure that the existence of national programs are revealed to partner nations.

5. Required Industrial Structure

For each program, the partner governments should define general "business" ground rules. Industry would then be responsible for establishing "world-class" teams within these basic rules. This kind of industry-to-industry cooperation would assure the most effective mechanism for tapping each participating nation's research, acquisition and life cycle support strengths.

6. Maintenance of Competitive Market Forces

The diversity of technical approaches within a cooperative program should assure that competitive forces are maintained, if emphasized early in the program.

7. Government Role

Governments must address "up front" issues, such as budgetary contribution, dollar distribution of work, technology transfer controls and third country sales; however, issues of industrial structure and individual firm participation should be left for industry to decide.

8. Execution of Programs

Barriers to the successful execution of cooperative programs must be addressed through changes in policy, procedures and organization. For example, the area of combat identification raises a number of challenges that require resolution by senior leadership in the above manner.

B. Swedish-U.S. Cooperation

Sweden's arms cooperation activities with DoD already includes annual, high-level coordination meetings and an active national representative structure in which senior military research representatives meet frequently to discuss arms cooperation matters. In addition, U.S. and Swedish industrial representatives meet to foster arms cooperation activities, in conjunction with the annual reciprocal procurement MOU meetings.

The Task Force approach would strengthen arms cooperation activities between the U.S. and Sweden by giving added emphasis to top-down interaction procedures and interaction organizational structures. The following elements illustrate the thrust of the recommendations for additional process enhancements to current activities:

1. Geopolitical/Military Objectives

The U.S. has a significant interest in security cooperation with Sweden. Despite its diminutive size, Sweden is a key to stability in the Nordic/Baltic region, and is an active participant in coalition/peacekeeping operations (in such areas as Bosnia and Somalia) and armaments cooperation with the U.S. (Gripen: ~40% U.S. components; AT-4; MOU; many data exchange annexes; MOU).

Accordingly, annual talks should be held between the SecDef and the Swedish Defense Minister to discuss common geopolitical/military objectives and needs. The initial part of these talks should be in the presence of senior representatives of the CJCS, the Supreme Commander of Sweden, the USD(A&T), the Director General of the Swedish Defense Material Administration (FMV), the USDP and his counterpart, and the Swedish Under Secretary of Defense.

2. Selection of Common Mission Problems

The military, policy and acquisition chiefs should also have their own periodic meetings. The CJCS and the USD(A&T), for example, should meet with the Swedish Supreme Commander, who controls acquisition funds as well as requirements, and the FMV Director General, who coordinates the work

of the Army, Navy and Air Force Materiel Commands, to explore, in greater detail, the areas of common mission needs, and the selection of areas to investigate for possible cooperative efforts. However, the tone must be set at the ministerial level.

For each of the military, policy and materiel acquisition groups, there should be a designated office to coordinate/implement actions on a continuing basis, including the promotion of activities at subordinate levels and other agencies of interest.

3. Requirements Generation

In the selected mission areas, the CJCS and the Swedish Supreme Commander would promote structured cooperation between the U.S. Joint Staff and operational commands and the appropriate Swedish military commands. This interaction would be the principal source for requirements generation in support of Swedish/US cooperation, and would be supplemented by cost, schedule, technology and industrial inputs from the USD(A&T) and the FMV Director General. These offices would then coordinate the resultant research and acquisition cooperation as well as data exchange agreements to be executed by the Services and FMV.

4. Satisfying Industrial and Economic Objectives

The agreed-to joint activities should be conducted through the bilateral Swedish-U.S. Reciprocal Procurement MOU Committee, and should continue to be overseen by the USD(A&T) and the FMV Director General from the perspective of coalition benefits. The Committee would be charged with reviewing and defining program selection criteria, specific goals, program structures, and broad industrial/economic objectives.

5. Required Industrial Structure

For cooperative programs important to both nation's security, the U.S. and Swedish governments should establish general "business" ground rules. Basic dollar allocation for each program should be set according to the investment being made by each government. Industry teams would then be established through industry-to-industry agreements and arrangements. Such cooperation would assure the most effective mechanism for tapping each country's research and acquisition strengths. For example, a U.S./UK/Swedish Future Medium-Range Air-to-Air Missile (FMRAAM) co-development program would be overseen by the U.S. Air Force, the RAF and the FMV. The process for establishing the industrial structure for such an emerging program could provide the vehicle for determining how the partner nations should define business ground rules, and how industry should respond to its challenge of creating "world-class" teams.

6. Maintenance of Competitive Market Forces

The FMRAAM program described above is an example of single-source development. When pitted against an improved AMRAAM option, "alternative strategic competition" is borne. To be effective, however, it must be explicit, and both nations must be offered a role in the AMRAAM program (proportionate to their expenditures) should it win the competition.

7. Government Role

Governments must address "up front" issues, such as budgetary contribution, dollar distribution of work, technology transfer controls and third country sales; however, issues of industrial structure and individual firm participation should be left for industry to decide.

8. Execution of Programs

Barriers to the successful execution of cooperative programs must be addressed through changes in policy, procedures and organization. This framework sets forth procedures that could be implemented immediately and lead to greatly improved arms cooperation between the U.S. and Sweden.

APPENDIX F

STRATEGIC COMPETITION

STRATEGIC COMPETITION

In weapons systems development generally, and in international developments in particular, a competitive environment will lead to improved systems with better economics (see Appendix F for a summary analysis of competition). Maintaining a competitive environment is somewhat more difficult for international armament cooperation with Europe because:

- Historically, industrial corporations have been national suppliers closely tied to governments;
- Suppliers are few and maintaining jobs is a high priority for national governments; and,
- Suppliers provide "eyes and ears" into industry for the governments.

It is particularly difficult to maintain a competitive environment once major weapons systems are selected, and no comparable system will be developed for several years. At such a time, senior officials need to increase the clarity and reality of what this Task Force calls "strategic competition" to effectively motivate all involved.

As described in Table F-1, techniques to strengthen the competitive environment include:

- Segmenting the system in order to award subsystems to others;
- Intense engineering challenge on cost, quality, timeliness; and,
- Functional alternatives—that is, alternative and different systems to provide the same function.

Table F-1. Situation Versus Technique

Situation	Technique
A. Three qualified bidders	• No action required; competition should be adequate.
B. Two sources on a small system	• Run parallel awards with different shares of the total (e.g., aircraft engines, missiles) to each supplier
C. Single source, easy to replace in less than 2 years and $=+1 year	• Provide R&D to alternative supplier
D. Single source, hard to replace in less than 2-4 years and $=+2 years	• Keep functional competition explicitly visible and viable
E. No other source	• Segment the system, so that more is provided for good performance, less for bad (e.g., mods, spares, field support) • Intense engineering linkage with improvement targets several levels deep in the system • Functional alternatives, different than the subject weapons systems

Segmenting the system (prime and subcontractors, development production and support) is a well-practiced technique. However, intense engineering challenges and functional alternatives are not practiced, as well as they might be, to maintain a competitive environment.

A period of intense engineering frequently follows the award of a major project in order to challenge and improve the original design in commercial situations, such as oil refineries, chemical plants, paper mills, computer systems, and auto paint systems. When successful, it permits continual performance improvement at less cost. Commercially, many of the improvements are not primarily

cost driven, but rather by other factors such as environmental compliance, safety, quality, turnaround time, capital avoidance, and product flexibility. Even after the initial design and build, significant improvements can be made. Weapon system developers routinely improve technical features, but could do more to emulate the commercial "intense engineering" model for cost, support and logistics simplification.

"Functional alternatives" are a powerful competitive motivator, but they take longer, are more difficult to use effectively, and require a change in the user's system. Major functional alternatives have been "jeep for mule," "carrier for battleship," and "PGMs for massive firepower." Similar opportunities exist today:

- Unmanned aircraft for manned or surveillance aircraft;
- Simulation for actual activity;
- Current system vs. next-generation system; and,
- Jointly-developed systems for nationally-developed systems.

In such cases, a greater burden rests on senior executives, who must:

- Clarify the functional alternatives, which are often not clear;
- Identify the systemic changes by the user required to use the functional alternative;
- Shape a competitive situation that can be resolved in a reasonable period of time; and,
- Still meet operational demands for availability.

Achieving this requires:

- Institutional memory of prior performance and a longer range plan for such competition;
- Consistency of objective and action over several years by the procurement authority;
- Ability to shift from one solution to another; and,
- Incentives and disincentives that are clear and early.

To be successful, functional alternatives and intense engineering challenges require considerable anticipation and planning.

Recommendation:

The Task Force recommends that, for all weapons systems costing more than a pre-defined amount, a portfolio of functional competitors be created and maintained by USD(A&T).

APPENDIX G

SINGLE SOURCE LEARNING BENEFITS VERSUS THE BENEFITS OF COMPETITION

SINGLE SOURCE LEARNING BENEFITS VERSUS THE BENEFITS OF COMPETITION

Introduction

This appendix summarizes the results of prior research[1] on the relative benefits of single source awards (to gain the benefits of economies of scale and "learning") versus the benefits of competition during weapon system acquisition. It includes a brief summary of learning curves (and the effects of competition on them), the historical results of competition during weapon system production, empirical results of competition during development, and some reported results of "mission competition."

Learning Curves

The learning curve (also referred to as the progress or cost improvement curve) represents the relationship between the unit cost of an item and the cumulative production quantity of that item. The convention most often used is the percent reduction in unit costs based on a doubling of production quantity. The relationship is mathematically expressed as an exponential function, as shown in Figure G-1, in which the exponent is the slope of the curve. The learning curve was first formulated by T.P. Wright in 1936, based upon the observed reduction in manufacturing labor hours for airframes as cumulative production quantities increased. The concept was further developed to price-quantity relationships, most notably by the Boston Consulting Group.[2]

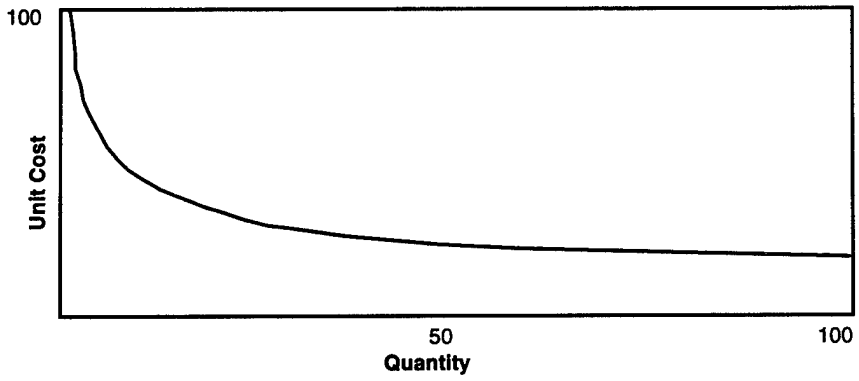


Figure G-1. The Learning Curve

The relationship shown in Figure G-1 suggests that the total cost of an item is minimized by procuring that item from a single manufacturer, all other things being equal. The difficulty with the above statement is that all other facets are rarely equal. For example, the fundamental premise of the learning curve is that a manufacturer seeks to reduce costs (and thereby improve returns) in a competitive market. Unfortunately, the learning curve has been employed to project weapon system costs from single source suppliers that, once selected, have operated in the absence of competition and, therefore, had limited incentives to reduce costs. Observed "learning curves" in such cases reflect more of the negotiated positions of buyer and seller than true cost reductions by the manufacturer. In fact, since many sole source awards (even if "fixed price") are based on actual (or historical) costs plus a fee, there is a perverse incentive for the contractor to increase costs (and justify the increase) rather than to go down the learning curve. For this reason, sole source learning curves have rarely been very steep.

---

[1] By TASC, Inc.

[2] Perspectives on Experience, Boston Consulting Group, 1968.

The above considerations are best exemplified by the early historical studies on the effect of "recompeting" single source contracts (i.e., opening them up for a competitive second source to get a share of the business). If the learning curve were always followed (regardless of the presence or absence of competition), the original manufacturer would always win the largest share of recompetitions because of its advantage of being further down the learning curve. The empirical data, summarized in Table G-1 and Figure G-2, suggest that the potential of the learning curve alone is insufficient to cause significant cost reductions in a sole-source environment. Early "recompetitions" resulted in very significant price reductions compared to the projected single source prices. Thus, competition is viewed as "breaking the curve."

Table G-1. Summary of Earlier Studies of Recompetitions

Study Organization	*Year*	*Number of Systems*	*Observed Savings*
Scherer	1964	--	25%
McNamara	1965	--	25%
Rand	1968	--	25%
BMI	1969	20	32%
Army Elec. Command	1972	17	50%
LMI	1973	--	15-50%
Joint Economic Committee	1973	20	52%
IDA	1974	20	37%
LMI	1974	1	22%
ARINC	1976	13	47%
APRO	1978	11	12%
IDA	1979	31	31%
TASC	1979	45	30%

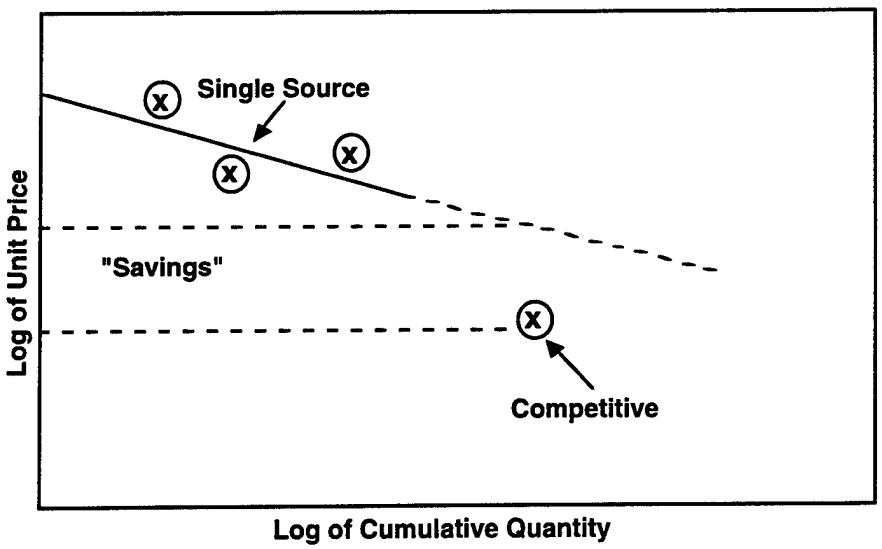


Figure G-2. Calculations of Savings from Earlier Studies of Competition

The magnitude of the observed price reductions varies across the historical studies. Factors such as type of equipment, quantity variation, equipment design changes, and manufacturing process technology directly influence the learning curve slope and the ability to assess a "break in the curve." Thus, broad generalizations of projected savings are inappropriate.

Competition During Production

Research on the effect of continuous competition (or dual sourcing) of U.S. tactical missiles indicates that second source producers demonstrate steeper learning curves than the initial producer of the same equipment. The steeper curves enable the second sources to exert price pressure on the initial source. Observed cost improvement rates for competitive missile programs are shown in Table G-2.

Table G-2. First and Second Source Learning Curves

Program	Cost Improvement Rate		Percent Difference
	First Source	Second Source	
AIM-7F	0.87	0.84	3
BULLPUP	0.82	0.80	2
TOW	0.98	0.89	9
AIM-9L	0.90	0.83	7
AIM-9M	0.94	0.85	9
HELLFIRE	0.94	0.92	2
TOMAHAWK	0.79	0.71	8

The steeper second source learning curves exert price pressure on the original producers that force the original to react to the pressure by changing price behavior. Such behavior modification is evidenced by a change in the original producer's learning curve. An immediate drop in the initial producer's unit cost is demonstrated as a break or downward "shift" of the learning curve. Continuing cost reductions are revealed as a steepening or "rotation" of the learning curve. The observed price reactions by initial producers enable those producers to remain price competitive with the second source throughout the remainder of the production run. Thus, competition drives both producers to more efficient pricing than previously demonstrated by the original manufacturer, as shown in Figure G-3.

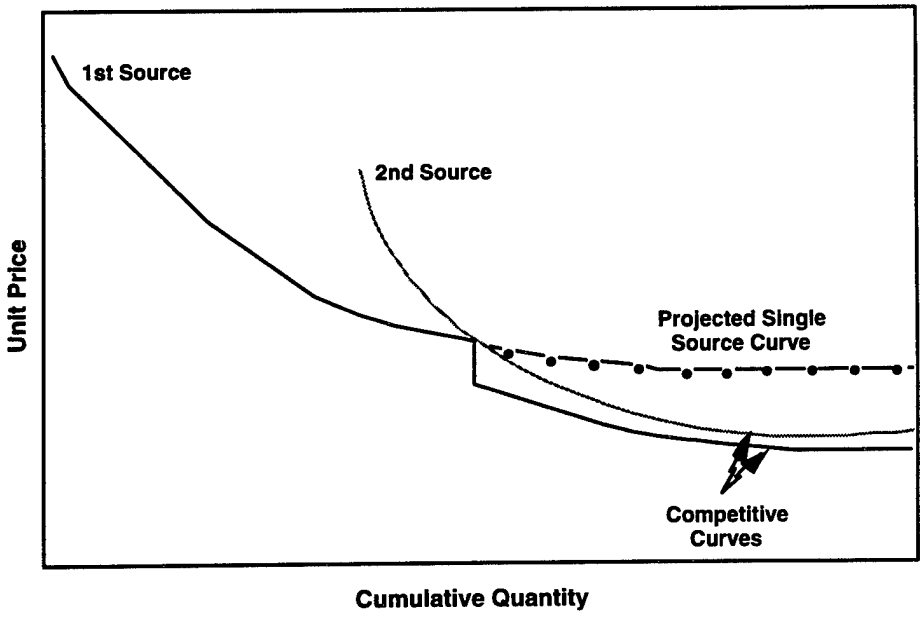


Figure G-3. Initial Source Reactions to Dual-Sourcing the Impact of Production Phase Competition

Changing end-item price behavior does not always imply total program cost savings. The non-recurring costs associated with establishing a competitive source for a complex weapons program are often substantial. Obviously, to achieve true "savings," these costs must be recouped in the form of lower prices.

The missiles programs shown in Table G-1, tended to involve a significant portion of variable costs and achieve relatively large production runs. The cost benefits (or price reductions) of competing systems with high fixed costs or limited production runs are not always so obvious. In fact, for a selected "few of a kind" systems, a single source may be the most effective approach for a given buy. In such a case, rather than maintaining two inefficient production lines, "competitive pressure might be maintained via "mission competition" as described later in this appendix.

In addition to production cost considerations, competition during production is often employed to improve weapon system quality and reliability. For example, the U.S. Navy's Sidewinder guidance unit is competitively produced by Raytheon and Ford Aerospace. Both producers' end items are exceeding reliability goals by over 100 percent, as shown in Figure G-4. These reliability improvements directly reduce operating and support costs.

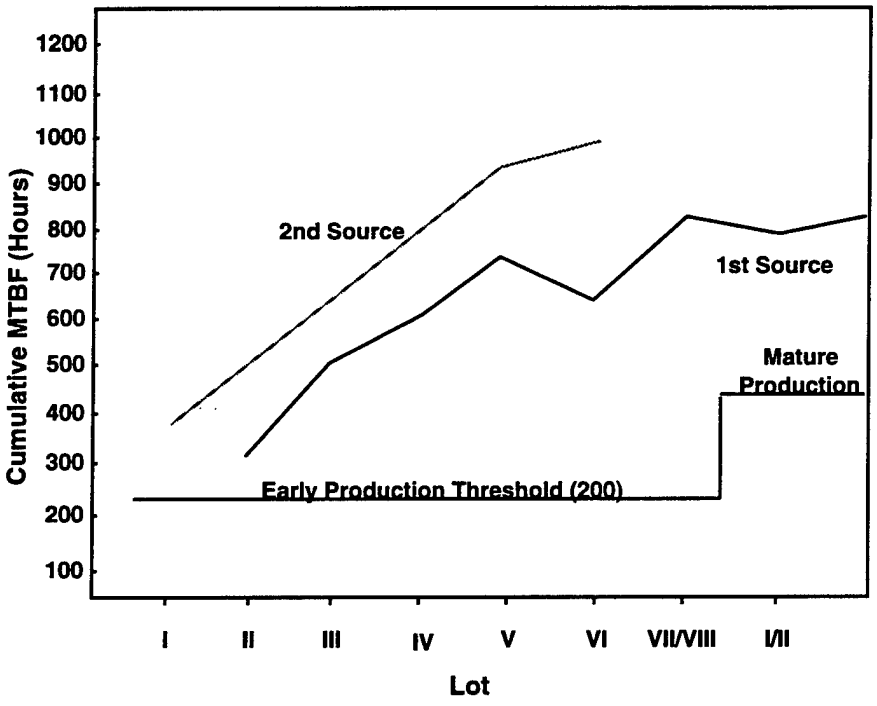


Figure G-4. SIDEWINDER Production Verification Test

Competition During Development

As described above, the learning curve describes the relationship between unit costs and production quantities; however, the design trades made during system development largely determine the starting point (or first unit cost) of the curve. Recent research indicates that competition during development leads to lower cost designs, evidenced by a lower first unit cost, as shown in Figure G-5.

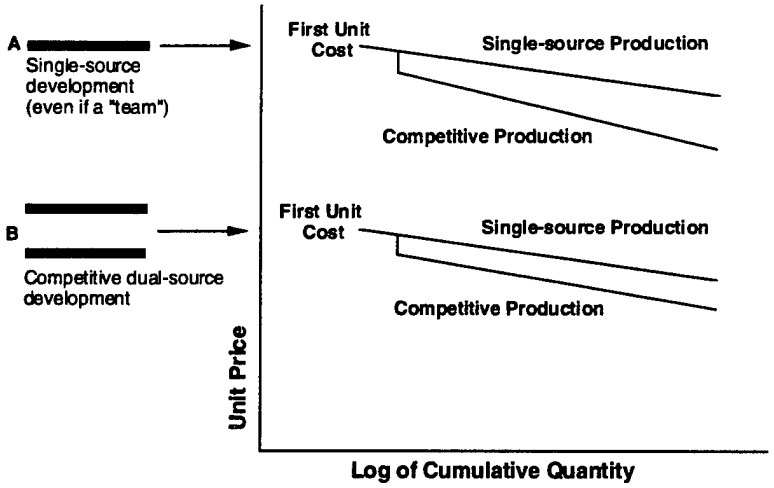


Figure G-5. The Impact of Development Competition

An example of the above framework is the U.S. Air-Launched Cruise Missile (ALCM) which realized an average unit cost savings of 20 to 30 percent (downward shift in the starting point of the curve) due to development competition. ALCM also realized a 20 percent steeper learning rate than anticipated for a single source producer—as a result of maintaining competition during production. Finally, compared to a similar single source development (ground-launched cruise missile), the ALCM also experienced significantly less total program cost growth, as shown in Figure G-6. In fact, only by introducing competition later in the program was the cost growth finally controlled (as seen in Figure G-6). This doubling of production estimated costs during the sole-source development of a weapon system (as seen in Figure 6 for the ground-launched cruise missile) is frequently found in the sole-source environment, but not in competitive development programs.

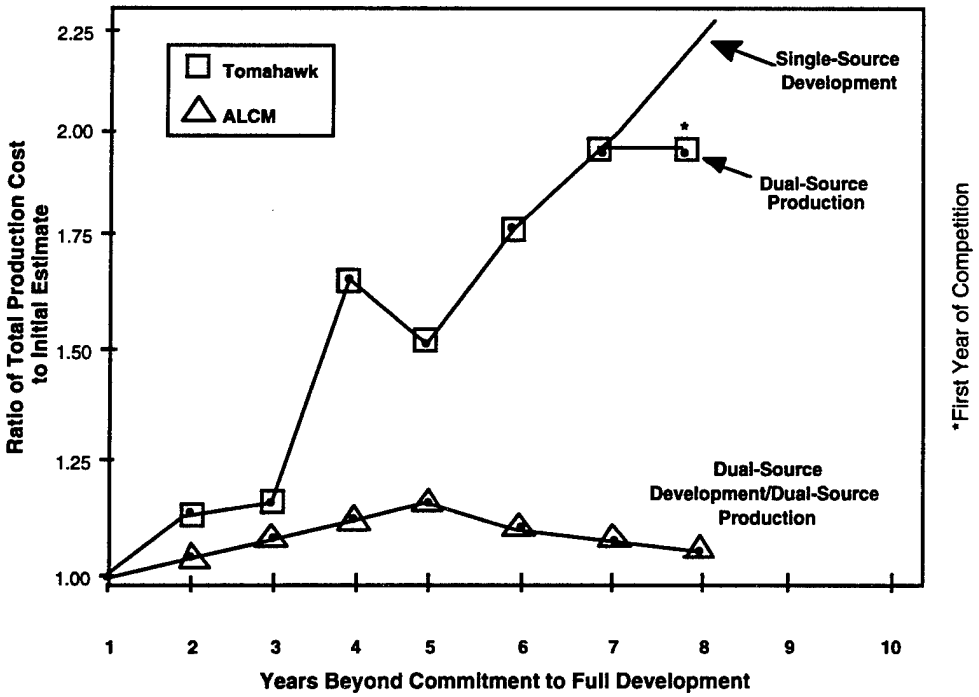


Figure G-6. The Impact of Development Competition on Growth of Production Cost Estimates

In addition to recurring production cost effects, development competition has reduced initial non-recurring start-up costs. For example, competition during development of the SRAM II missile resulted in start-up costs for key subsystems that were 50 percent less than anticipated. These results are summarized in Figure G-7.

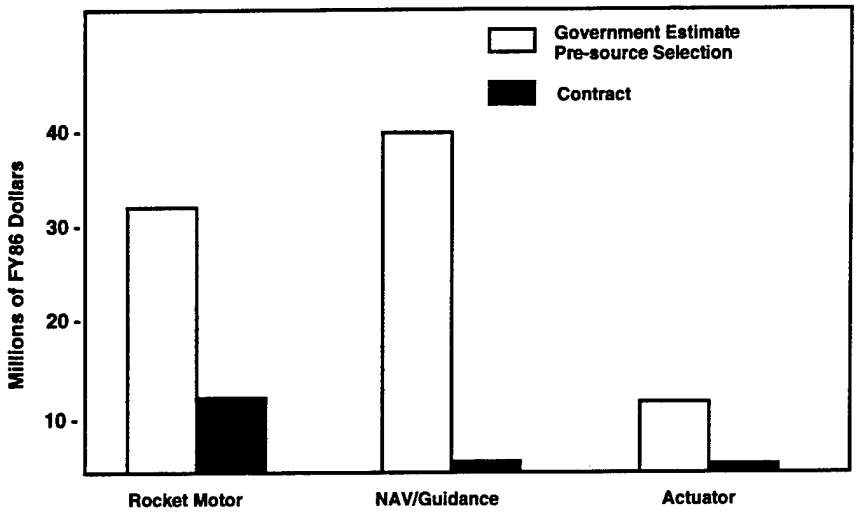


Figure G-7. The Effects of Development Competition on SRAM II Production Start-up Costs

Mission Competition

In many cases, particularly in today's reduced defense budget environment, it is not possible to have dual sources funded in production, or even in development. For these cases, it is extremely desirable to create the viability of a competitive alternative (of some form). Known as "mission competition," this refers to the presence of a different solution to the mission requirements in order to place competitive pressures on weapons suppliers to reduce costs and improve schedule or performance. Mission competition may involve:

- Another Service's system (an alternative weapon system);
- Commercial alternatives;
- Substitute subsystems from other platforms;
- Different technical or operational solutions;
- Emerging developmental systems versus non-development solutions;
- Upgrades of old systems versus new developments; or,
- Acceleration of advanced technology versus current systems.

These types of mission competitions become increasingly realistic and beneficial—as well as necessary to present viable competitive alternatives—as government resources and budgets become more constrained. Two recent examples of mission competition are the C-17/Non-Development Airlift Aircraft (NDAA) and the Alternate Fighter Engine (AFE).

The NDAA effort was initiated as a commercial supplement or replacement for the C-17 cargo aircraft. McDonnell Douglas, the C-17 (sole-source) prime contractor, aggressively reacted to the competitive mission pressure by dramatically reducing costs and improving performance. Cost reductions were realized due to competition, improved negotiations based on "should costs," and the use of a stable long-term (multi-year) contract. All of the C-17 cost reductions, summarized in Figure G-8, were achieved through the competitive environment.

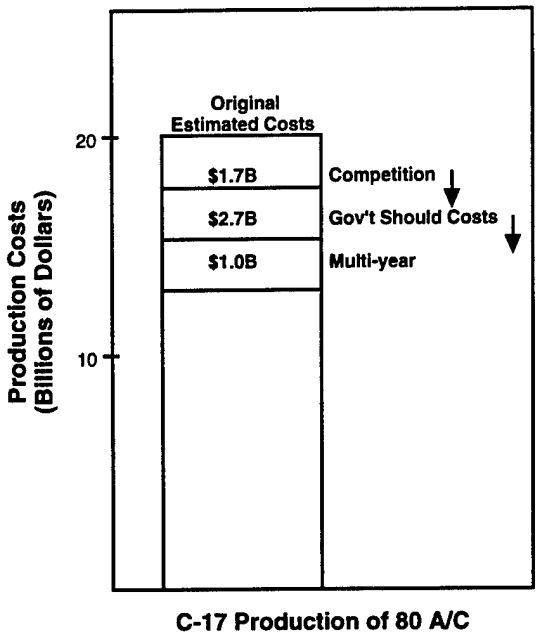


Figure G-8. Example Mission Competition (C-17)

The primary goal of the Alternate Fighter Engine (AFE) program was to enhance the quality and reliability of propulsion systems on F-15 and F-16 aircraft. The program involved a competition between two alternative propulsion systems, the Pratt & Whitney F100 and the General Electric F110. Key source selection criteria included durability, reliability, maintainability, operability and life-cycle costs. This emphasis resulted in a 50 percent reduction in support costs—from approximately $600 per flight hour to $300 per flight hour. This reduction was attained through a decrease in engine removal rates and maintenance man-hours, as shown in Figure G-9.

These two examples of mission competition clearly demonstrate that competition is not solely viewed as two manufacturers building the same item. Rather, competition is viewed as a spectrum of techniques that are tailored to the unique requirements of a program or mission area.

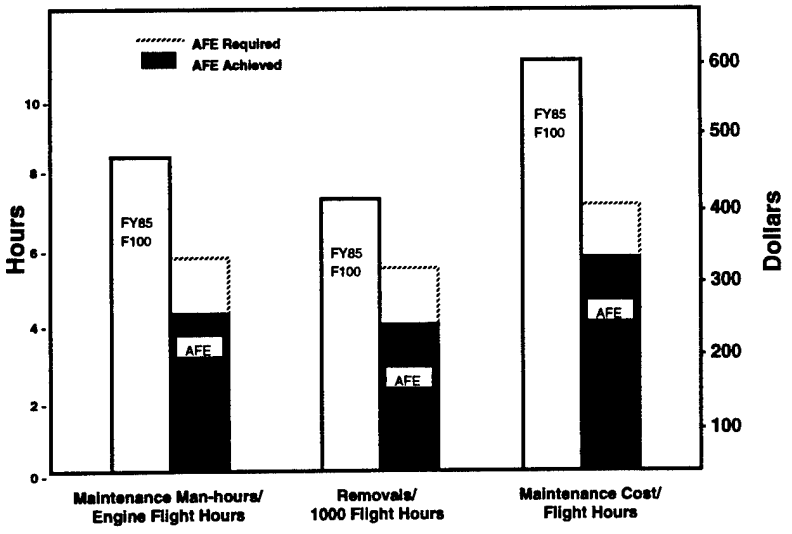


Figure G-9. The Effects of Competitive Production on AFE Logistics Parameters

Summary

Competition is the driving force to achieve cost reductions along with performance enhancements. The cost reduction benefits of increasing quantity—particularly in a competitive environment—are amply represented by the learning curve, which has been employed (and empirically supported) for over 60 years. The empirical results of cases where competition is injected into previous single source contracts indicates that competition "breaks the curve." Continuous competition drives producers to more efficient operations than previously demonstrated by the single source (developer or producer). This approach may be particularly appropriate for high volume systems with relatively high variable costs. In those cases involving small production runs and high fixed cost (such as 80 aircraft), mission competition also provides sufficient competitive pressure to "break the curve."

APPENDIX H

LOGISTICS IN ARMAMENTS COOPERATION

LOGISTICS IN ARMAMENTS COOPERATION

Background

The matter of logistics in armaments cooperation is recognized by most people in the acquisition business as a subject that should be addressed continuously, starting during the development phase of a project. Rarely is it done, however, unless the parties to the cooperative effort have similar logistics support systems. In the past, the general practice was for the cooperating parties to do their own national logistics planning or to establish some type of cooperative support organization to assume logistic support responsibilities once the system was well into the production phase. The most common practice has been for each party to do its own logistics planning and subsequent procurement of spare parts and maintenance services.

On a broader scale, within NATO, logistics has long been recognized as a very important factor in planning, building and carrying out the movement and maintenance of NATO forces. Logistics within NATO is addressed in two functional categories: consumer and production.

Consumer Logistics

Consumer logistics are grouped into four functional elements:

- Material/equipment (vehicles, weapons, ammunition, fuel, etc.) - acquisition, storage movement, distribution, maintenance, evacuation, disposition.
- Personnel - movement, evacuation, hospitalization
- Facilities - acquisition or construction, maintenance, operation and disposition.
- Services - provision of food, laundry, bath facilities, graves registration, etc.

Consumer logistics is generally the responsibility of the Senior NATO Logisticians' Conference (SNLC) which is comprised of senior logisticians from the NATO member nations. The SNLC has oversight management responsibility for coordination and cooperation for the civil aspects of consumer logistics for the alliance. Operational military logistics cooperation and coordination falls under the NATO military command structure. Allied Command Europe and the NATO Atlantic Command both have Logistics Coordination Centers.

It should be noted that, until recently, each NATO nation was directly responsible for continuous logistics support of its own forces. The alliance management organizations noted above are primarily for coordination and cooperation purposes. In 1992, NATO approved MC-319, Logistics Policies and Principles, which was intended to move logistics from a national concern to a collective responsibility, and give NATO commanders authority to redistribute assets. However, when NATO recently activated its Bosnia Peacekeeping operations, logistics support reverted to national responsibility.

Notwithstanding this latest development, two major NATO organizations are involved in logistics support to NATO forces:

- The NATO pipeline system under the Central Europe Operating Agency—established in 1958 to facilitate the supply of fuels to allied forces, and

- The NATO Maintenance and Supply Agency (NAMSA)—established in 1958 to assist NATO nations by the common procurement and supply of spare parts, and by providing the maintenance and repair facilities necessary to support various weapons systems in their inventories.

Over the years since its establishment, NAMSA has provided logistics support services to most of the NATO nations' forces stationed within Allied Command Europe. It provides support for systems that have been acquired by two or more nations, if requested to do so by those nations. It also provides logistics support services for systems developed or produced under cooperative agreements endorsed by NATO authorities. The armament systems that NAMSA supports include:

- Sidewinder
- Multiple Launch Rocket System (MLRS)
- CL-89 (Reconnaissance UAV)
- CL-289 (Reconnaissance UAV)
- NATO Air Defense Ground Environment
- NATO AWACS
- C-130
- Patriot

It should be noted that the nations employing these systems in NATO are not required to use the services offered by NAMSA. For example, the US uses NAMSA services only for the C-130, Patriot and MLRS.

Production Logistics

Production logistics in NATO are concerned with the long-term planning, budgeting, design, development and procurement of equipment. The coordination and oversight responsibilities for production logistics within NATO is vested in the Conference of National Armaments Directors (CNAD). The CNAD is comprised of the top acquisition officials from the NATO nations, and has a broad range of acquisition of oversight responsibilities, ranging from research and development cooperation to cooperative production of armaments. While the CNAD does not have the authority to direct any national actions, it does provide a forum for reviewing, discussing and coming to agreement on armaments cooperation projects. One of the approaches used by the CNAD on larger cooperative projects involving several nations is to encourage the interested parties to reach an agreement on cooperative development or production through direct nation-to-nation negotiations. Once accomplished, the CNAD will consider whether to designate it as a NATO-approved project, and whether to establish a NATO Production and Logistic Office (NPLO) or accept the management organization included in the agreement. Past and present cooperative program organizations established under this arrangement include:

- NATO HAWK NPLO
- NATO Seasparrow
- NATO Helicopter (NH-90)
- NATO Improved Link-11
- NATO European Fighter Aircraft

MEADS will become a NATO-approved cooperative program as it moves through its development. Future logistics support should be included now in its program planning and organizational structure.

Summary

Logistics is ordinarily recognized to be an extremely important factor that must be considered for all armaments and equipment employed unilaterally or by NATO nations' forces. For the most part, however, logistics for cooperative programs is given serious consideration only after such systems are well into the production phase. This generally holds true for both bilateral cooperative projects and large multilateral cooperative programs.

Within NATO, several established procedures and organizations exist to provide effective logistics support to cooperative programs. For those non-NATO cooperative programs in which the US is involved, US logistics organizations and procedures, as well as those of the partner nation, can and should be employed early in development to take advantage of potential schedule and cost savings through common provisioning, spare parts procurement, etc.

Recommendations

- For all cooperative programs, logistics should be a primary factor early in the design and development phases of the system.

- All cooperative programs should have a designated deputy program manager for logistics, and a primary objective of the cooperation should be to have, as a final product, common equipment and common logistics support.

- For those cooperative programs that require the basing of systems in Allied Command Europe, NAMSA should be seriously considered as the agency to provide logistics support.

APPENDIX I

NATO'S ROLE IN ENHANCING ARMAMENTS COOPERATION

NATO'S ROLE IN ENHANCING ARMAMENTS COOPERATION

Introduction

NATO has had a continuing high level of interest and activity in armaments cooperation since its establishment in 1949. In the context of armaments cooperation, it is important to remember that NATO is not a supranational organization, and has no mandatory powers over national governments. The responsibility of equipping and maintaining forces is a national one. With the exception of certain areas, such as command, control and communications, airborne early warning and control, and common infrastructure works, NATO is not directly involved in research, development or production of equipment. NATO's role in armaments is one of advice, coordination and encouragement—the overall objective being to foster cooperation, and improve and strengthen the collective defense efforts of the NATO Alliance. The fundamental belief is that NATO member countries will be able to better equip their forces, within the constraints of national defense budgets, by working together than by working separately.

That said, over the years, NATO's role in armaments cooperation has evolved and grown from coordination of cooperative production programs (e.g., G-91 aircraft, Atlantic Maritime Patrol aircraft, HAWK surface-to-air missile systems) to monitoring, coordinating and encouraging a very broad range of alliance defense acquisition activities encompassing basic research, development, production, operation/maintenance and logistics support.

There is now a very well-established organization for armaments cooperation within NATO. In addition, there is an effective alliance military structure which is responsible for preparing and certifying the alliance military operational requirements in order to guide those research, development and production activities agreed to by the involved NATO nations. The Conference of National Armaments Directors (CNAD), the NATO Command, Control and Communication Committee, and the NATO Air Defense Committee are the top-level NATO groups directly involved in overseeing alliance armaments cooperation activities. The cognizant top-level military authorities for preparing and approving alliance military requirements are the NATO Military Committee and the Major NATO Commands (MNCs). The Supreme Headquarters Allied Powers Europe (SHAPE) has the lead role in most NATO requirements evolution because of its area of responsibility.

Discussion

In looking at what NATO can do to enhance armaments cooperation, it is necessary to keep in mind the extensive (and often time-consuming) bureaucratic organization that has evolved through the years since NATO's inception. For purposes of this discussion, the Task Force has limited its scope to military requirements generation activities and the armaments research, development and production organization. The problem of improving armaments cooperation under the NATO "umbrella" is not new. CNAD has long struggled with this issue, and continues to do so to this day. In the past, NATO's armaments cooperation has covered a broad spectrum of activities (as noted above), but its primary roles now involve:

- Information exchange under an extensive organization of working groups, committees and agencies;
- Non-binding coordination of armaments programs under CNAD, the C^3 Committee, and the Air Defense Committee;
- Common-funded NATO infrastructure projects managed by NATO agencies, such as the Communications Information Agency and the Command and Control Management Agency;

- CNAD oversight of armaments cooperation projects designated as NATO projects at the request of the participating nations; and,
- Generation of Alliance Military Requirements (often after the fact) to support NATO armaments research, development and production projects.

In early 1987, NATO Secretary General Lord Carrington recognized that NATO needed to have a closer connection between CNAD and alliance force planning, national military requirements, and the armaments programs of member nations. It was agreed that CNAD needed to have a more structured method of reviewing, comparing and determining the alliance and national military requirements for armaments. Consequently, CNAD chartered an *ad hoc* group to analyze these problems and recommend a solution. The result was a process called the Conventional Armaments Planning System (CAPS). The CAPS process involved a comprehensive review of both national and alliance military requirements that included all aspects (e.g., schedules, priorities, capabilities, numbers) of the armaments capabilities called for by the nations and the major NATO commanders. The CAPS process further identified which national systems appeared to meet MNC's requirements, and whether the efforts of the nations on similar projects might be accomplished cooperatively or as presently planned.

The CAPS process was a success from the aspect of identifying the requirements of the nations and the MNCs. It was also a success because it identified which requirements were being addressed and which were not—corrective action could then be focused on the latter. In addition, the process attempted to indicate those projects that warranted NATO priority, and which might be conducted as cooperative efforts between or among the various NATO nations. However, the process was never taken seriously by the nations' armaments directors, nor did CNAD give the process priority consideration during its deliberations. While the CAPS process is still in place, it is not being used as originally intended; it is now basically an information exchange process.

If NATO is to become more responsive to requirement of the MNCs and a more potent promoter of armaments cooperation, it will need to revitalize the CAPS process. The Armaments Directors will need to give CAPS stronger support, and commit themselves to working cooperatively on armaments programs—from research and development through production and logistics support. The Armaments Directors must also commit themselves to convincing their respective defense ministers to allocate resources to support priority cooperative programs.

Recommendations

1. The Under Secretary of Defense for Acquisition and Technology, as the U.S. Armaments Director, should propose to CNAD, at its next meeting, that the results of the CAPS process be given higher priority consideration and revitalized as follows:
    - An *Executuve Summary* should be established in the CAPS process to reflect the truly top priority programs, top NATO priorities for each nation, and the priorities of the NATO Major Commands;
    - The Armament Directors should personally be involved in the selection of these priority programs;
    - The Armament Directors should determine how to address programs of NATO-wide interest; for other programs of shared national priority, side meetings should be held to discuss cooperation (in the case of overlapping programs) or provisions for procurement or co-production (when one country's program could fill the needs of another); and,
    - CNAD should report the top ten priority programs to the Defense Planning Committee for endorsement and a commitment of national funds.

2. The Military Committee of NATO and the Major NATO Commands should give priority in their requirements generation activities to working with CNAD via the CAPS process. The CAPS process offers the best mechanism to focus attention on those high priority, but otherwise unfunded, requirements.

APPENDIX J

CURRENT POLICY AND REGULATORY AMBIGUITIES

CURRENT POLICY AND REGULATORY AMBIGUITIES

The Department of Defense (DoD) must balance a variety of competing forces in its approach to international armaments cooperation—while some policies, regulations and statutes encourage cooperation, others clearly work against it. By attempting to offset the perceived potential drawbacks (e.g., lost jobs, weakened industrial base, reduced technological edge, technology transfer) with the potential benefits (e.g., strengthened political and military linkages with other nations, enhanced coalition military capability, greater efficiency of coalition investments), DoD decisions on international armaments cooperation reflect the growing ambiguities and uncertainties that exist in today's national security policies and their underlying statutory and regulatory framework. Thus, the Task Force believes it is critical that a new, clear policy in this area be adopted. A summary of current policy, regulatory and statutory ambiguities that program managers must face in making balanced decisions on whether and how to cooperate on armaments development and acquisition follows.

The basic enablers for international cooperation are found within Title 10 of the U.S. Code. It provides DoD with:

- The basic authority to acquire logistic support, supplies and services for overseas forces from foreign sources;
- The authority to realize cross-servicing agreements;
- Waivers for certain statutory export restrictions for defense acquisition programs, and waivers of statutory pricing requirements (e.g., FMS charges);
- An OSD-managed budget for international cooperative R&D programs, and a foreign cooperative testing program;
- Statutory waivers for specific programs (e.g., AWACS); and,
- Authority for procurements of foreign communications support and related supplies and services.

The principal constraints on international cooperation derive from national export control statutes as follow:

- The Arms Export Control Act, implemented by the International Traffic in Armaments Regulations and administered by the Department of State;
- The Export Control Act of 1979, as amended, implemented by the Export Administration Regulations and administered by the Department of Commerce;
- The Computer Security Act of 1987, administered by the Department of Commerce;
- The Atomic Energy Act, 22CFR1017.1, administered by the Departments of Energy, Commerce and State;
- National espionage laws and associated Executive Orders, prohibiting the disclosure of classified information; and,
- Title 10 of the U.S. Code, which imposes mandatory Congressional reporting requirements on the international transactions of DoD (the Case Act).

Many DoD directives govern the activities of program managers in their attempts to pursue new international armaments cooperative programs:

- ***Dealing with Acquisition Program Administration and Management***

  ⇔ DoD Directive 5000.1., February 23, 1991, "Defense Acquisition" and DoD Directive 5000.2., February 23, 1991, "Defense Acquisition Management Policies and Procedures"[3]

  + DoD's acquisition community encourages the consideration of foreign options at each milestone. The 5000-series process requires program managers to develop formalized Cooperative Opportunities Documents. While statutes require such a document for Category I programs, DoD policy encourages such documentation for Category III, III and IV programs as well. In essence, this requirement promotes the consideration of similar projects, the modification of foreign projects to meet US requirements, and the analysis of alternate forms of cooperation while attempting to balance the requirements described below for the evaluation of potential loss associated with the transfer of U.S. technology and sensitive information.

  – Another provision of the regulation requires each program manager to prepare a Technology Assessment/Control Plan for all international cooperative programs (including a foreign availability/risk assessment and a detailed technology control plan for sensitive technologies).

  + DoD Directive 2010.6, March 5, 1980, "Standardization and Interoperability of Weapons Systems and Equipment within the North Atlantic Treaty Organization"

  + DoD Directive 5530.3, June 11, 1987, (with change 1), "International Agreements"

  + In addition, there are a variety of other mechanisms that encourage cooperation with allies, including:

    - Reciprocal procurement MOUs with 21 countries, and
    - Umbrella MOUs for cooperative R&D with 5 countries

  – DoD Directive 2140.2, June 26, 1992, "Recoupment of Non-Recurring Costs (NC) on Sales or Licensing of U.S. Items"

- ***Export and Technology Transfer Controls***

  – DoD Directive 2040.2, January 17, 1984, (with change 1), "International Transfer of Technology, Goods, Services and Munitions"

  – DoD Directive 5105.38, August 10, 1978, (with change 1), "Defense Technology Security Administration"

- ***Information Security and Disclosure***

  – DoD Directive 5105.42, June 14, 1985, "Defense Investigative Service"

  – DoD Industrial Security Regulation/Manual (see also Executive Order 12829, January 6, 1983, "National Industrial Security Program")

  – DoD Directive 5205.7, January 4, 1989, "Special Access Programs"

---

[3] Key: "+" = encourages cooperation; "-" = discourages cooperation; "⇔" = both encourages and discourages cooperation

- DoD Directive 5210.2, January 12, 1978, (with changes 1 and 2), "Access to an Dissemination of Restricted Data"
- DoD Directive 5210.83, November 15, 1991, "Department of Defense Unclassified Controlled Nuclear Information"
- DoD Directive 5230.11, June 16, 1992, "Disclosure of Classified Military Information to Foreign Governments and International Organizations"
- DoD Directive 5230.24, March 18, 1987, "Distribution Statements on Technical Documents"
- DoD Directive 5230.25, November 6, 1984, "Withholding of Unclassified Technical Data from Public Disclosure"

- ***Special Procurement Regulations***
  - DoD has established regulations (FARS/DFARS) for implementing the Office of Procurement Policy Act of 1974, including clauses hindering foreign participation as follows:
    - Set asides (small business, disadvantaged firms, etc.)
    - Mobilization base requirements
    - "Buy America" requirements for:
      - Miniature ball bearings
      - Precision components for mechanical time devices
      - High purity silicon
      - Precision optics
      - Forging Items
    - Procurement preferences for domestic sources in:
      - Wool
      - Specialty metals
      - Hand or measuring tools
    - Patent rights stipulations required for DoD contracts
    - Financial system and reporting requirements
    - Requirement for use of U.S.-flagged transportation

One of the most sensitive and thorniest aspects of policy related to international armaments cooperation—one that potential collaborators find extremely difficult to deal with—is that of third-country sales and transfers. U.S. arms transfer policies are both ambiguous (at times deliberately) and subject to a wide range of factors, some of which are political. Perhaps most irritating—and offensive—to potential partners is that these restrictions constitute an extra-territorial application of U.S. law. In addition, a general lack of predictability in U.S. policy regarding third-country sales, and the widespread sense of many potential partners that commercial, not security, considerations drive these policy decisions, has been very damaging to U.S. collaborative efforts.

As defined within its national security strategy and other executive decision documents, this Administration's national armaments transfer policies encourage armaments cooperation when it:

- Ensures that the technological advantage of U.S. forces is retained;
- Helps friends and allies to deter and defend against aggression;

- Promotes regional stability;
- Promotes peaceful conflict resolution, armaments control, human rights, democratization and other foreign policy objectives; and,
- Enhances the U.S. defense industrial base.

Within this framework, however, decisions with respect to transfers of both armaments and technology are, esssentially, made on the basis of whether the U.S. government (including the incumbent administration) sees such transfers as advantageous.

Given the complexities of armaments transfer decisions and the multiple U.S. interests involved, decisions on specific initiatives continue to be made on a case-by-case basis. Case reviews are guided by a set of criteria attempting to balance between legitimate armaments sales to support the national security of friends and allies and the need for multilateral restraint against the transfer of armaments that would undermine stability or enhance the military capabilities of hostile states. These criteria include elements that encourage transfers as well as those that discourage them:

+ Appropriateness of the transfer in responding to legitimate U.S. and recipient security needs;
+ The degree to which the transfer supports U.S. strategic and foreign policy interests through increased access and influence, allied burden sharing, and interoperability; and,
+ Consistency with U.S. regional stability interests, especially when considering transfers involving power projection capability or the introduction of a system that may foster increased tension or contribute to an armaments race;

APPENDIX K

TERMS OF REFERENCE

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-3010

ACQUISITION AND
TECHNOLOGY

OCT 1 4 1995

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference -- Defense Science Board Task Force on International Arms Cooperation

You are requested to form a Defense Science Board Task Force on International Arms Cooperation. International arms cooperation is an increasingly attractive and important acquisition strategy for the United States for a variety of reasons. These include: gaining access to state-of-the-art technologies, potential economies for both R&D and production, and military interoperability for both warfighting and support. In addition, as defense budgets around the world shrink, nations are faced with the difficulty of maintaining a viable defense industrial capability without eliminating the presence of continuous competition (and the advantages in both cost and performance that the presence of competition provides). Thus, a broadening of the defense industrial capability to global scale -- a trend matching that taking place in the commercial economy -- is another strong argument for international arms cooperation. Nonetheless, the U.S. has participated in international arms cooperation in only a very limited manner. Thus, the Task Force must investigate two broad issues:

1. A description of a generic model of international arms cooperation for the 21st Century which it will assure that: (1) effective competition is maintained; (2) effective two-way technology transfer occurs; (3) maximum use is made of the civil industrial base; and (4) the United States is assured of access to all critical military technologies.

2. The identification of specific management actions that must be implemented to allow successful program execution on international efforts, i.e., where the promised benefits of economic efficiency, enhanced performance, and shorter schedules will actually be achievable.

In each of these areas, detailed analysis and recommendations are requested, with specific examples to be worked out. Criteria and specific cases of prior cooperation and potential future cooperation will be examined. As part of the effort, current, planned, and potential international cooperative efforts should be evaluated against the analyses and recommendations associated with the two broad study areas. The Task Force will initially focus on U.S./European programs. The final report for this phase should be completed by May 1, 1996.

The sponsor for the Task Force will be Mr. Joshua Gotbaum, Assistant Secretary of Defense, Economic Security. Dr. Jacques S. Gansler will serve as the Chairman of the Task Force. Mr. Andrew Gilmour from the office of PDASD, International Programs, will serve as the Executive Secretary and Major T. Van Horn, USA, will serve as the Defense Science Board Secretariat representative. In further support of this effort, representation from the Office of the Secretary of Defense staff, the Joint Staff, the Military Departments, and other Defense Agencies will be critical to the success of this Study and implementation of the Task Force's recommendations.

This Task Force will be operated in accordance with the provisions of P.L. 92-463, the "Federal Advisory Committee Act," and DoD Directive 5104.5, the "DoD Federal Advisory Committee Management Program." It is not anticipated that this Task Force will need to go into any "particular matters" within the meaning of Section 208 of Title 18, U.S. Code, nor will it cause any member to be placed in the position of acting as a procurement official.

Paul G. Kaminski

APPENDIX L

BRIEFINGS

BRIEFINGS PRESENTED TO TASK FORCE

Thursday, 19 October 1995

• DoD International Programs View of Armaments Cooperation: Activities, Challenges, Problems, Opportunities	Mr. Al Volkman Acting DASD(IP)
• International Technology Cooperation and Transfer	Dr. Anita Jones DDR&E
• Medium Extended Air Defense System (MEADS)	Col Tom Haller, USA PM Corps SAM
• National Polar-Orbiting Operational Environmental Satellite (NPOOES)	Col William Campbell ODUSD (Space)
• Security Assistance Perspective	Mr. Diehl McKalip DSAA

Friday, 20 October 1995

• U.S. Crest Armaments Cooperation Review Competitive, but Cooperative Model	Dr. Jacques Gansler Task Force Chairman
• Army Perspective on International Armaments Cooperation	Mr. Gilbert Decker Assistant Secretary of the Army (RD&A)
• Air Force Perspective on International Armaments Cooperation	Col Terry Swan, USAF USAF IPO
• Navy Perspective on International Armaments Cooperation	VADM William Bowes, USN Principal Deputy Assistant Secretary of the Navy (RD&A)
• Export Controls and Armaments Cooperation	Mr. David Tarbell DTSA
• Current Program Competition Models	Mr. Stan Hicks Navy IPO

Monday, 20 November 1995

• AIM-9X	Capt. Thomas MacKenzie, USN PM AIM-9X
• Perspectives on International Cooperation	RADM John Snyder, USN (Ret)
• Intercooled Recuperative Engine (ICR)	Dr. Cyril Krolick NavSea 03R, PM ICR
• GE-SNECMA, GE-Volvo, GE-FSX, GE-Rolls Royce	Mr. Brian Rowe Chairman Emeritus GE Aircraft Engines

• X-31	Col Mike Francis, USAF PM X-31
• Update on MEADS	COL David Keifer, USA International Programs

Tuesday, 21 November 1995

• MOU Trends/Overview of International Cooperative Opportunities Groups (ICOGs)	Mr. Al Volkman Principal Director, Armaments Cooperation (IP)
• Upgrade to Air-to-Air Missile (FMRAAM)	Lt Col Cal Derck, USAF SAF
• Stand Off Air-to-Ground Missile	Col Kevin O'Conner, USAF SAF
• Multifunctional Information Distribution System	Capt. David Fitch, USN PM MIDS

Tuesday, 19 December 1995

• International Aspects of JAST	Dr. William Scheuren, DARPA
• JAST Joint Requirements Process	Col Goodwin, USAF PMO JAST
• Common Logistics Opportunities	VADM LaPlante, J-4 Director for Logistics
• Foreign Comparative Testing (FCT)	Col Randy Catts, USA Manager, FCT

Wednesday, 20 December 1995

• ICOG Activities and Future Plans	Mr. Al Volkman Principal Director, Armaments Cooperation (IP)

Monday, 22 January 1995

• ICOG Activities and Future Plans	Mr. Al Volkman Principal Director, Armaments Cooperation (IP)

Tuesday, 23 January 1995

- No presentations

Monday, 26 February 1995

• International Space Program	Mr. Robert Davis DUSD (Space)

Tuesday, 27 February 1995

• Theater Missile Defense Review	Dr. George Schneiter Director, Strategic & Tactical Systems
• Update on MEADS	Mr. A. Q. Oldacre Deputy PEO, Missile Defense

Monday, 25 March 1995

• ACTDs	Mr. Thomas Purdue ADUSD Ballistic Missile Defense

Tuesday, 26 March 1995

• Source Code	Mr. Everett Greinke IPAC

APPENDIX M

REFERENCES

REFERENCES

The Army Digitization Master Plan, Annex K (International Strategy), January 1995. Strategy to facilitate efforts to develop doctrine and systems that are capable of interoperation, and provide an overarching framework for coordinating the leveraging of advanced and emerging technologies that will enhance the ability of the U.S. and its allies to field systems that are inherently interoperable.

Army Science and Technology Master Plan, FY95, Volume I. Section G of Chapter 7 (Technology Transfer) addresses International Technology Leveraging.

Army Science and Technology Master Plan, FY95, Volume II, Annex E. International Armaments Strategy and Near-Term Foreign Opportunities.

The Benefits of International Cooperation, Army Material Command, August 1994. Discusses and illustrates, by example, the benefits of international armaments cooperation for both the U.S. and its allies.

Combined Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative Research and Development Projects With Allied Countries, OSD, June 1990. Report on the Nunn Program.

Critical Technologies Plan for the Committees on Armed Services of the United States Congress, 1 May 1991. OSD plan describing 21 technologies considered essential for maintaining the qualitative superiority of U.S. weapon systems, and to outline an investment strategy to manage and promote the development of these technologies.

Defense Industrial Cooperation With Pacific Rim Nations, DSB Task Force, October 1989. Examines the potential for achieving U.S. security objectives in the Pacific Rim area through defense industrial cooperation with the nations of that area.

European Defense and the Future of Transatlantic Cooperation, RAND (National Defense Research Institute), 1993.

Evaluation of International Technology Base Programs, November 1988, DSB Summer Study, November 1988 (Volumes I and II). Review of the international cooperation mechanisms related to the technology base in terms of their effectiveness.

Finding Common Ground: U.S. Export Controls in a Changed Environment, National Academy Press, Washington, D.C., 1991. Examines two fundamental questions: "How should U.S. export control policies be organized in a post-Cold War world?" and "Are U.S. export control policies formulated in a manner consistent with, and supportive of, the full scope of U.S. interests?"

Industry-to-Industry International Armaments Cooperation, Phase I: NATO Europe. Provides the findings and recommendations of the DSB Task Force on Industry-to-Industry International Armaments Cooperation between the U.S. and the European NATO countries.

International Cooperation and Data Exchange to Enhance the Army's Technology Base, Army Science Board, August 1990.

The International Cooperative Research and Development Program (Nunn Program), 1995 Report to Congress. OSD report on scope, purpose and status of the Nunn Program.

International Cooperative Programs Management Manual, OSD Draft Instruction, DoD 5134.1-M, April 1991. OSD Directive describing policies and procedures, assigned responsibilities, and administrative instructions on managing DoD participation in international cooperative programs and associated activities.

International Management and Coordination (DoD), DPACT Year-End Review, Section E, 1989. Discussion of the coordination/integration of the various DoD components that participate in the international cooperative process.

International Technology Base Cooperation Plan, March 1991. OSD Plan for the exploitation of the international technology base as a resource for developing the technologies considered by the Secretary of Defense to be the most critical to ensuring the long-term qualitative superiority of U.S. weapon systems.

Key Technologies Plan, Foreign International Technology Assessment Abstract, DoD Technologies Plan, November 1992. Assessment of the key technologies in the context of international cooperation.

Logistics Support (Defense News Marketing Supplement, October 1995). Covers a significant amount of foreign equipment and includes an international markets section.

Management Plan for Administration of DoD NATO/Non-NATO Cooperative Research and Development Program (Nunn Program), January 1992. OSD policy and strategy for the Nunn Program.

Multinational Coproduction of Military Aerospace Systems, RAND (Project AIR FORCE), October 1981.

Multinational Development of Large Aircraft: The European Experience, RAND, July 1980. Discusses transatlantic weapon system procurement collaboration as a means of promoting NATO rationalization, standardization and interoperability (RSI) objectives.

Pros and Cons of International Weapons Procurement Collaboration, RAND (National Defense Research Institute), 1995.

A Review of European Armaments Collaboration, and Prospects for its Expansion under the Independent European Program Group, RAND, July 1987.

Standardization:

- **American, British, Canadian, Australian (ABCA) Armies Standardization Program Information Booklet**
- **ABCA Field Z, Naval Quadripartite Standardization Management Manual**
- **Air Standardization Coordinating Committee (ASCC) Information Booklet and ASCC Reference Catalog**

Streamlining the Development of International Research and Development (R&D) Agreements, PDASD (DUTP&IP), Memo of 12 October 1994. Implemented DepSecDef Memo of 14 Sept 1994, and provided additional guidance regarding this procedure.

Technology Access from the FS-X Radar Program, RAND (Project AIR FORCE), 1994. Discusses the issues surrounding U.S. access options to license technology from the Japanese active phased array radar under development for the FS-X.

Technology and Technology Transfer Policy (Draft), DSB Summer Study, August 1990. Examines the full range of technologies, both here and abroad, and identifies those with high potential to provide "leap frog capabilities" to U.S. forces for the next twenty years.

Transatlantic Collaboration: Government Policies, Industry Perspectives, RAND, 1993. Surveys U.S. industry plans for future collaborative partnerships with European firms, both in the context of government-sponsored programs, such as those funded in part by the Nunn Amendment of 1986, and partnerships that are, or will be, entirely industry funded.

The Transformation of the European Defense Industry, RAND (National Defense Research Institute), 1992. Emerging trends and prospects for future U.S.-European competition and collaboration.

Troubled Partnership, RAND (Project AIR FORCE), 1995. An assessment of U.S.-Japan collaboration on the FS-X fighter.

TTCP—The Technical Cooperation Program. A U.S., UK, Canadian, Australian, New Zealand organization.

- **Conventional Weapons Technology Manual (Procedures and Terms of Reference (TTCP Subgroup W), June 1993.** The activities of the subgroup may encompass basic research, exploratory development, and demonstrations of advanced technology development in conventional weapons.
- **Conventional Weapons Technology Proceedings of the 21st Meeting, 12-16 October 1992 (TTCP Subgroup W), October 1992.** Report on the status of the various activities of Subgroup W.
- **Handbook, 1989.** History, origin, aims, relationships with other international organizations, structure and major POCs.
- **Policies, Organization and Procedures in Non-Atomic Military Research and Development (POPNAMRAD), February 1993.** Basic manual for TTCP.
- **U.S. Intensifies Efforts to Meet Missile Threat, Aviation Week & Space Technology, 16 October 1995.**